Vol. 12, No. 23
December 15, 1987

Energy Research Abstracts

Abstracts 47010-49229

Office of Scientific & Technical Information
UNITED STATES DEPARTMENT OF ENERGY

CURRENT INFORMATION ON ENERGY

To provide immediate and complete coverage of literature related to major Department programs, the Office of Scientific and Technical Information provides an on-line retrieval system, data bases, and current-awareness publications. The Energy Data Base (EDB), which contains all unclassified, unlimited energy and nuclear related information processed by OSTI since 1974, and the Nuclear Science Abstracts Data Base (NSA), which covers nuclear information from 1948 through June 1976, are available for machine searching using commercial on-line retrieval systems. All information in the publications listed below, plus additional backup information, is included in the EDB. Current information being added to the EDB is available for on-line searching via the OSTI Automated Retrieval System (OARS) accessible to DOE and contractors through the Integrated Technical Information System (ITIS).

The publications described below and access to ITIS/OARS are available to Department of Energy and contractor components from the Office of Scientific and Technical Information, U. S. Department of Energy, P. O. Box 62, Oak Ridge, TN 37831/Telephone (615) 576-1301; FTS 626-1301.

PUBLICATIONS OF THE OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION

Energy Abstracts for Policy Analysis (EAPA)

A monthly abstract journal devoted to the analysis of energy research, conservation, and policy. Scope and coverage are limited to substantive articles or reports and emphasize legislative, regulatory, and other legal aspects, as well as social, economic, and environmental impacts. *EAPA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The annual subscription price is $63.00 for domestic (North America) or $78.75 for foreign (outside North America) subscribers; a single issue is $6.00 or $7.50, respectively.

Energy Research Abstracts (ERA)

A comprehensive semimonthly abstract journal devoted to all areas of energy-related information produced by the Department of Energy, other U. S. government organizations, and foreign governments. *ERA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The annual subscription price for the 24 issues is $146.00 for domestic (North America) subscribers or $182.50 for foreign (outside North America) subscribers. A single issue is $14.00 or $17.50, respectively.

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DOE is prepared to grant exclusive or nonexclusive, revocable licenses under DOE-owned U. S. patents and patent applications; this semiannual publication provides abstracting and indexing coverage of this literature. *PAL* is available as PB87-946800 from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 on a standing order basis through an NTIS Deposit Account. To establish an NTIS account, send the minimum $25.00 deposit to NTIS, Attn: Customer Accounts. A single issue is $12.00 for domestic (North America) and $24.00 for foreign (outside North America).

Energy Meetings (EM)

A monthly listing of conferences, symposia, workshops, etc., pertaining to DOE's programmatic interests. *EM* is available on subscription (use PB87-901500) from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. The annual subscription price is $70.00 for domestic subscribers and $140.00 for subscribers outside the North American continent; a single issue is $8.00 and $16.00, respectively.

The following semimonthly bulletins are also available from the National Technical Information Service. The annual subscription rate for one volume (calendar) year (24 issues; no indexes) is $80.00 for domestic (North America) and $160.00 for foreign (outside North America) subscribers; use the identifying order number (PB- No.) when subscribing.

***Acid Precipitation (APC)*–PB87-901000.** Acid precipitation, including effects and possible control measures.

***Buildings Energy Technology (BET)*–PB87-900700.** Technology required for energy conservation in buildings of all types.

***Coal-Based Synfuels (CBS)*–PB87-901400.** Conversion of coal into gaseous or liquid fuels.

***Coal Combustion and Utilization (CCU)*–PB87-914400.** Coal combustion, including fluidized bed combustion, and direct utilization of coal for power generation, fuel cells, and MHD generators.

***Coal Preparation and Pollution Control (CPC)*–PB87-900800.** Coal preparation and cleaning and reducing pollution from its direct combustion.

***Direct Energy Conversion (DEC)*–PB87-946600.** Photovoltaics, magnetohydrodynamics, electrohydrodynamics, thermoelectrics, thermionics, and fuel cells.

***Energy from Biomass (EFB)*–PB87-900600.** Biomass production, conversion, and utilization for energy.

***Geothermal Energy Technology (GET)*–PB87-914700.** Exploration, development, and utilization of geothermal resources.

***Heavy-Ion Reactions (HIR)*–PB87-900500.** Heavy-ion ($A > 4$) reactions.

***Laser Research (LAR)*–PB87-901100.** Laser research and development, excluding applications.

***Nuclear Fuel Cycle (NFC)*–PB87-913400.** Both front and back ends of the nuclear fuel cycle.

***Nuclear Reactor Safety (NRS)*–PB87-913500.** Accident analysis, safety systems, radiation protection, decommissioning and dismantling, and security measures.

***Radioactive Waste Management (RWM)*–PB87-902900.** Management aspects of transport and storage, waste processing, waste disposal, waste storage, radioactive effluents, and shipping containers.

***Solar Thermal Energy Technology (STT)*–PB87-901200.** Research and development of efficient and reliable solar thermal conversion systems.

***Transportation Energy Research (TER)*–PB87-900900.** Energy-efficient advanced automotive propulsion systems and transportation energy conservation.

***Unconventional Petroleum (UCP)*–PB87-901300.** Secondary and tertiary recovery of petroleum and oil shales and tar sands.

INTERNATIONAL ENERGY PUBLICATIONS

The Office of Scientific and Technical Information (OSTI) cooperates in the publication of international abstract journals with the following: (1) International Atomic Energy Agency, International Nuclear Information System, Vienna, Austria, for *Atomindex;* (2) International Energy Agency, Biomass Conversion Technical Information Service, Dublin, Ireland, for *Biomass Abstracts;* and (3) International Energy Agency, IEA Coal Research, London, England, for *Coal Abstracts.* In each case, the cognizant foreign agency provides the non-U. S. information to OSTI for inclusion in the Energy Data Base; in turn, OSTI provides the U. S. information for input into the respective journal.

Atomindex

A semimonthly abstract journal providing worldwide coverage of information on nuclear science and technology. *Atomindex* is available by subscription from Bernan Associates UNIPUB, 10033-F King Highway, Lanham, MD 20706. The cost of an annual subscription, 24 semimonthly issues and semiannual and annual cumulative indexes, is $355.

Biomass Abstracts

A bimonthly abstract journal with comprehensive coverage of information on the conversion of biomass to energy. *Biomass Abstracts* is available free to DOE components and contractors from OSTI. Non-DOE organizations may obtain *Biomass Abstracts* from Biomass Conversion Technical Information Service, Institute for Industrial Research and Standards, Ballymun Road, Dublin 9, Ireland, for 60 IR pounds per year for participating countries and 90 IR pounds per year for nonparticipating countries. Make checks payable to the Institute.

Coal Abstracts

A monthly abstract journal providing comprehensive worldwide coverage of information in the field of coal science and technology. *Coal Abstracts* is available to DOE components and contractors from OSTI. Non-DOE organizations may obtain *Coal Abstracts* from IEA Coal Research, Technical Information Service, 14-15 Lower Grosvenor Place, London SW1W 0EX, England, for 110 pounds sterling per year.

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ENERGY RESEARCH ABSTRACTS

ABOUT THE OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION

The Office of Scientific and Technical Information (OSTI) in Oak Ridge, Tennessee, has been the national center for scientific and technical information for the Department of Energy (DOE) and its predecessor agencies since 1946. In developing and managing DOE's technical information program, OSTI places under bibliographic control not only DOE-originated information but also worldwide literature on scientific and technical advances in the energy field and announces the source and availability of this information. Although the literature of science is emphasized, coverage extends to DOE programmatic, socioeconomic, environmental, legislative/regulatory, energy analysis, and policy-related areas. To accomplish the mission of furnishing centralized support for Departmental elements in managing their scientific and technical information, OSTI builds and maintains computerized data bases and disseminates information via computerized retrieval systems and announcement publications such as abstract journals, bibliographies, and bulletins. Direct access to OSTI's Energy Data Base (EDB) and Nuclear Science Abstracts Data Base (NSA) is available to the U. S. scientific community through commercial on-line retrieval systems. Access to these data bases from outside the United States is available only through formal exchange agreements. The current-year EDB records, DOE Research-In-Progress, and various other specialized DOE data bases are available to DOE offices and contractors and other government agencies through the OSTI Automated Retrieval System (OARS), which is a major component of the Integrated Technical Information System (ITIS). In addition to providing access to the OSTI on-line systems, ITIS serves as a gateway to other government and commercial systems and provides information merging for customized information products. The Office of Scientific and Technical Information has developed systems to record and communicate energy-related research-in-progress information, to track research report deliverables from DOE contractors, to test and make available DOE-funded computer software programs with scientific and management applications, and to produce special publications in support of DOE program offices. To manage DOE's technical information resources effectively, OSTI's program is one of continual development and evaluation of new information products, systems, and technologies.

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Energy Research Abstracts (ERA) provides abstracting and indexing coverage of all scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs originated by the U. S. Department of Energy, its laboratories, energy centers and contractors. *ERA* also covers other energy information prepared *in report form* by federal and state government organizations, foreign governments, and domestic and foreign universities and research organizations. The user should remain aware that *ERA* coverage of non-report literature is limited to that generated by Department of Energy activity.

ERA is comprehensive in its subject scope, encompassing the DOE's research, development, demonstration, and technological programs resulting from its broad charter for energy sources, supplies, safety, environmental impacts, and regulation.

ERA is available on an exchange basis to universities, research institutions, industrial firms, and publishers of scientific information. Inquiries should be directed to the Office of Scientific and Technical Information, P. O. Box 62, Oak Ridge, TN 37831.

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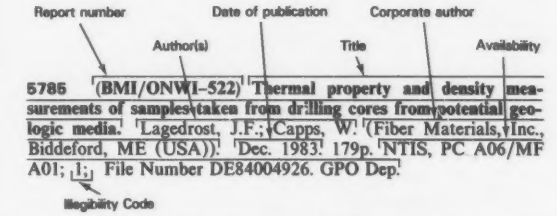
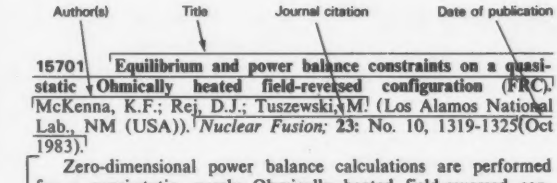
ABSTRACTS IN *ENERGY RESEARCH ABSTRACTS*

The principal elements of abstract entries for a typical research and development report and a typical technical journal article are illustrated below.


Report number
Date of publication
Corporate author
Author(s)
Title
Availability
5785 (BMI/ONWI-522) Thermal property and density measurements of samples taken from drilling cores from potential geologic media. Lagedrost, J.F.; Capps, W. (Fiber Materials, Inc., Biddeford, ME (USA)). Dec. 1983. 179p. NTIS, PC A06/MF A01; 1; File Number DE84004926. GPO Dep.
Illegibility Code

Abstract

Density, steady-state conductivity, enthalpy, specific heat, heat capacity, thermal diffusivity and linear thermal expansion were measured on 59 materials from core drill samples of several geologic media, including rock salt, basalt, and other associated rocks from 7 potential sites for nuclear waste isolation. The measurements were conducted from or near to room temperature up to 500°C, or to lower temperatures if limited by specimen cracking or fracturing. Ample documentation establishes the reliability of the property measurement methods and the accuracy of the results.


Author(s)
Title
Journal citation
Date of publication
15701 Equilibrium and power balance constraints on a quasi-static Ohmically heated field-reversed configuration (FRC). McKenna, K.F.; Rej, D.J.; Tuszewski, M. (Los Alamos National Lab., NM (USA)). Nuclear Fusion; 23: No. 10, 1319-1325 (Oct 1983).

Abstract

Zero-dimensional power balance calculations are performed for a quasi-static, purely Ohmically heated field-reversed configuration. Without compression, the constraint imposed by radial pressure balance limits the power input. Estimates of the energy loss from impurity line radiation as well as from classical and anomalous transport are given. Effects of cold puff gas injection are also investigated.

INDEXES TO *ENERGY RESEARCH ABSTRACTS*

Five indexes are provided for approaching the contents of each issue of *Energy Research Abstracts (ERA)*. Each index is preceded by an introduction that details the organization of the index and the principles by which it was compiled. The reader is referred to these introductions for information not found in the index examples that follow.

• Corporate Author Index

Technical report literature is indexed using the name of the organization or institution responsible for the issuance of the report.

5785 (BMI/ONWI-522) Thermal property and density measurements of samples taken from drilling cores from potential geologic media. Lagedrost, J.F.; Capps, W. **(Fiber Materials, Inc., Biddeford, ME (USA)).** Dec. 1983. 179p. NTIS File Number DE84004926. GPO Dep.

is indexed as:

Fiber Materials, Inc., Biddeford, ME (USA)

• Personal Author Index

Each author's name is indexed in the form appearing on the document abstracted, with the exception that given names are reduced to initials:

Capps, W., *See* Lagedrost, J. F.
Lagedrost, J.F., Thermal property and density measurements of samples taken from drilling cores from potential geologic media, 9:5785 (R;US)
McKenna, K.F., Equilibrium and power balance constraints on a quasi-static Ohmically heated field-reversed configuration (FRC), 9:15701 (J;US)
Rej, D.J., *See* McKenna, K.F.
Tuszewski, M., *See* McKenna, K.F.

• Subject Index

The subject index consisting of entries naming specific materials, objects, and processes is arranged alphabetically. Document titles, informative phrases, or both specific to these entries are arranged alphabetically under the entries.

SALT DEPOSITS
Density
Thermal property and density measurements of samples taken from drilling cores from potential geologic media, 9:5785 (R;US)
REVERSED-FIELD PINCH
Energy Balance
Equilibrium and power balance constraints on a quasi-static Ohmically heated field-reversed configuration (FRC), 9:15701 (J;AT)

• Contract Number Index

DOE technical report literature is indexed using contract numbers. This index contains the contract number with corresponding abstract and report numbers.

AC06-76RL01830 **Fiber Materials, Inc., Biddeford, ME (USA)** 9:5785 BMI/ONWI-522

• Report Number Index

Technical report literature is also indexed using report numbers. This index includes information on where individual reports may be obtained. Patents and conference papers are indexed here as a matter of convenience. When a report is supplied under a File Number, that number is included in the availability statement. A file number–report number correlation is included for convenience.

BMI/ONWI-522	9:5785	NTIS, PC A09/MF A01. File Number DE84004926, Distribution Category MN-70

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CEA Centre d'Etudes de Saclay
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Springfield, VA

National Institutes of Health
National Library of Medicine
Bethesda, MD

NOVA Information Services Company
Commack, NY

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SUBJECT CONTENTS (NUMERICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts*. The following listing includes the totality of the 40 first-level and 289 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope definitions and limitations is available as DOE/TIC-4584-R6 from NTIS for $9.50.

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REFER ALSO TO CITATION(S) 47092

47010 **(DOE/PC/91271—T12) [Coal disintegration by high pressure water jet]: Technical progress report No. 12 for the period from August 15 to September 15, 1987.** Mazurkiewicz, M. (Missouri Univ., Rolla (USA)). Sep 1987. Contract AC22-86PC91271. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014809.

Cavitation tests continued. The first series of tests were conducted for three different back pressures in the cavitation chamber. The second series of tests were carried out without back pressure in the cavitation chamber. The results can be explained in the following manner: As the pressure was increased from p = 3500 psi to p = 5500 psi, there was no significant improvement in the cavitation effect, but due to the higher pressure within mixing chamber an increased degree of comminution occurred. The effect of higher pressure levels within the mixing chamber was discussed in Technical Report No. 9, where we determined that as the pressure was increased, an increase in the specific energy consumption occurred. Table 2 gives the results where no back pressure was used. We see that the same pattern is followed, i.e., as the pressure increases, the amount of comminuted coal increases together with an increase in the specific energy. Due to the design of the new slurry nozzle and conical nozzle adaptor inlet, the specific energy in this case is lower than for the case where only a direct water nozzle was used. From the results presented in Tables 1, 3, and 4 it can be noted that, for small changes in the back pressure, there is no significant change in the energy consumed during comminution. On considering the advantages of using a cavitation process for coal comminution it can be seen that a reduction in the specific energy consumption is achieved compared to the process conducted without back pressure, but this reduction is not very significant. However the process based on the application of a back pressure has one major disadvantage. This process can not be used as a cyclic process, since the chamber has to be emptied periodically. In our future tests we plan to use cavitating jets as a replacement for the direct high pressure jets. This suggestion, made by Dr. Yanaida, should help in increasing the effectiveness of coal comminution. 6 figs., 4 tabs.

47011 **(EUR—10904-EN) Performance testing of proprietary coal cleaning equipment.** Shaw, S.R.; Brown, D.W.; Parker, D.S. (British Coal, Stanhope Bretby. HQ Technical Dept.). 1987. 84p. Commission of the European Communities.

This research project has been carried out to obtain performance data on coal cleaning and dewatering processes, the benefits of which will enable coal preparation engineers to make the correct choice of process when faced with a particular type of coal. Eight performance tests of coal cleaning equipment were carried out at various coal mines in the United Kingdom. These included the Simonacco Baum jig at Bentinck Colliery; the ROSE washbox at Seaham Colliery; the DSM Cyclones at Houghton Main Colliery; the 720 mm Vorsyl at Moorgreen Colliery; the 610 mm Vorsyl at Dinnington Colliery; the Screenbowl centrifuges at Ollerton and Ashington collieries; the multi-roller filter belt presses at East Side coal preparation plant; and the solid bowl centrifuges at Hem Heath Colliery. Each was evaluated and then compared with one another.

47012 **(PB—87-204533/XAB) Fine grinding of coal by the turbomilling process. Report of Investigations/1987.** Davis, E.G. (Bureau of Mines, Tuscaloosa, AL (USA). Tuscaloosa Research Center). 1987. 15p. (BM-RI—9070). NTIS, PC A02/MF A01.

Library of Congress catalog card no. 86-600408.

The Bureau of Mines conducted studies on comminution of bituminous coal to the 2-micrometers particle-size range using the Bureau-developed turbomill. Both plant-grind size (80 pct minus 75 micrometers) and microsize (minus 10 micrometers) coal can be produced in a single step with the Bureau's turbomill. Plant-grind size coal milled in water, with Ottawa sand as the milling medium, was reduced to more than 45 pct minus 2 micrometers in 15 min, at 175 kW-h/mt. Plant-grind coal milled with steel shot was reduced to 57 pct minus 2 micrometers in 15 min, at 138 kW-h/mt. When diesel fuel was substituted for water, the milling of the coal was less effective and less energy efficient. Keeping the pulp dispersed was critical. Without an effective dispersant, the slurry became very viscous and increased the milling time, which resulted in higher energy requirements, low heat dissipation, and poor grinding efficiency.

0104 Processing

REFER ALSO TO CITATION(S) 47039, 47042, 47059, 47060, 47873

47013 **(AD-A—182333/5/XAB) Production of high-energy aviation fuels from advanced coal liquids. Phase 1. Final report, June 1986-February 1987.** Downen, J. (Strat Co., Salt Lake City, UT (USA)). Apr 1987. 80p. NTIS, PC A05/MF A01.

The objective of this program was to assess the feasibility of producing advanced fuels from coal liquids. The coal liquids used in this program were produced from the Close Coupled Integrated Two Stage Liquefaction System (ISTL) plant at Wilsonville, Alabama. The liquids were derived from subbituminous coal, Wydodack upper seam from Gillete Wyoming. The coal liquids were distilled into a 300-625 F fraction. Hydrogenation experiments were conducted on this distillate fraction using the Hydrogenation Reactor System (HRS) located at Wright-Patterson AFB, Ohio. SHell 424 nickel/molybdenum catalyst was used for heteroatom removal and aromatics saturation. The report details the analysis of these hydrogenated candidate fuels.

47014 **(DOE/ER—0326) Coal gasification: Direct applications and syntheses of chemicals and fuels: A research needs assessment.** Penner, S.S.; Alpert, S.B.; Beer, J.M.; Denn, M.; Haag, W.; Magee, R.; Reichl, E.; Rubin, E.S.; Solomon, P.R.; Wender, I. (California Univ., San Diego, La Jolla (USA)). Jun 1987. Contract AC01-85ER30076. 517p. NTIS, PC A22/MF A01; 1; GPO Dep. File Number DE88000129.

The DOE Working Group for an Assessment of Coal-Gasification Research Needs (COGARN - coal gasification advanced research needs) has reviewed and evaluated US programs dealing with coal gasification for a variety of applications. Cost evaluations and environmental-impact assessments formed important components of the deliberations. We have examined in some depth each of the following technologies: coal gasification for electricity generation in combined-cycle systems, coal gasification for the production of synthetic natural gas, coal gasifiers for direct electricity generation in fuel cells, and coal gasification for the production of synthesis gas as a first step in the manufacture of a wide variety of chemicals and fuels. Both catalytic and non-catalytic conversion processes were considered. In addition, we have constructed an orderly,

long-range research agenda on coal science, pyrolysis, and partial combustion in order to support applied research and development relating to coal gasification over the long term. The COGARN studies were performed in order to provide an independent assessment of research needs in fuel utilization that involves coal gasification as the dominant or an important component. The findings and research recommendations of COGARN are summarized in this publication.

47015 **(DOE/FE/60177—2428) Final report on the toxicological testing of groundwaters affected by underground coal gasification.** Hill, S.L.; Kocornik, D.J. (Western Research Inst., Laramie, WY (USA)). Sep 1986. Contract FC21-83FE60177. 27p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000288.

The effectiveness of several wastewater treatment processes for removing toxic constituents from UCG-affected groundwater was evaluated using the MICROTOX assay and the Ceriodaphnia affinis/dubia acute toxicity test. The treatment processes evaluated were reverse osmosis, ultrafiltration, and activated carbon adsorption combined with microporous filtration. Two UCG-affected groundwaters were used during this study. The first, Hanna groundwater, was collected five years after completion of a UCG operation at Hanna, Wyoming, and contained elevated concentrations of inorganic contaminants. The second, a simulated UCG-affected groundwater, was synthesized from Hanna groundwater and a UCG condensate water. It contained elevated concentrations of both inorganic and organic contaminants. The untreated Hanna groundwater was not acutely toxic to either of the test organisms used in this study, though Hanna groundwater treated by reverse osmosis was toxic to both. The toxicity of the treated water was attributed to copper and zinc contamination that occurred during the treatment process. The simulated UCG-affected groundwater was toxic to both test organisms. Phenolic compounds were primarily responsible for the toxicity to the MICROTOX organism; unionized ammonia was primarily responsible for the toxicity to Ceriodaphnia. Carbon adsorption combined with microporous filtration was more effective than ultrafiltration for removing organic carbon from the simulated UCG-affected groundwater; however, neither of these treatment processes removed ammonia. Thus, carbon adsorption combined with microporous filtration was more effective than ultrafiltration for reducing the toxicity of the simulated UCG-affected groundwater to the MICROTOX organism, but neither treatment was effective for reducing toxicity to Ceriodaphnia. 17 refs., 1 fig., 10 tabs.

47016 **(DOE/FE/60177—2432) Review of toxicity studies performed on an underground coal gasification condensate water.** Barker, F.P. (Western Research Inst., Laramie, WY (USA)). Sep 1987. Contract FC21-83FE60177. 21p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000385.

Three studies related to the toxicity of underground coal gasification (UCG) waters have bee conducted: (1) toxicity study of UCG water and its fractions as determined by the Microtox test, (2) toxicity study of biotreated UCG water as determined by the Microtox test, and (3) toxicity study of UCG water to macroinvertebrates. The results of these studies are summarized herein. The gas condensate water from the UCG process is extremely toxic as determined by assays with photoluminescent bacteria (Microtox), benthic (bottom-dwelling) macroinvertebrates (mayflies), and Daphnia magna (water flea). Microtox bioassays reveal that the toxic components of the water reside in both the organophilic and hydrophilic fractions, although the organophilic fraction is notably more toxic. A sequential treatment process reduced the toxicity of the UCG water, as measured by the Microtox test. Solvent extraction (to remove phenols) followed by ammonia stripping yielded a less toxic water. Additional treatment by activated sludge further reduced toxicity. Finally, the addition of powdered activated carbon to the activated sludge yielded the least toxic water. A bioassay technique was developed for lotic (running water) macroinvertebrates (Drunella doddsi and Iron longimanus). The toxicity results were compared with results from the traditional test animal, Daphnia magna. Short-term exposures to the UCG waters were more toxic to Daphnia magna than to Drunella doddsi or Iron longimanus, although the toxicity values begin to merge with longer test exposure. The greater toxicity seems to be related to a thinner exoskeleton. 26 refs., 2 figs., 6 tabs.

47017 **(DOE/PC/60050—8) Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly report for the period 1 July 1985-30 September 1985.** Scaroni, A.W.; Derbyshire, F.J.; Abotsi, G.M.K.; Solar, J.M.; Spears, R. (Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering). Sep 1985. Contract AC22-83PC60050. 22p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014863.

Catalysts have been prepared by the impregnation of Ambersorb XE-340 and chemically modified Ambersorb XE-340 supports with ammonium molybdate solutions and tested for their activities for thiophene hydrodesulfurization. The catalysts prepared on supports modified both by reaction with various oxidizing agents and by reaction with NH_3 at 400 and 600°C all showed very low HDS activity. This contrasts with their behavior for coal asphaltene conversion where it was found that their activity was promoted by prior reaction with NH_3 and suppressed by pre-oxidation. Much higher activity for thiophene HDS was measured for a catalyst prepared on an activated carbon (NORIT) support. Attempts have been made to improve the activity of the Ambersorb catalysts by changing the nature of the Mo precursor to make it more compatible with the aromatic and hydrophobic nature of the Ambersorb carbons. Preliminary experiments have shown some very promising results. Ambersorb XE-348 was impregnated using an molybdenum organometallic compound. It was found that the initial activity of this catalyst for thiophene HDS was almost 40% higher than for the Mo/activated carbon catalyst. Progress with the continuous flow reactor system is still being hindered by equipment failures. The vendors, Chemical Data Systems and Atuoclave Engineers, are making efforts to rectify the problems and to bring the system on stream as soon as possible. 3 refs., 6 figs., 2 tabs.

47018 **(DOE/PC/60050—9) Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly report for the period 1 October-31 December 1985.** Scaroni, A.W.; Derbyshire, F.J.; Abotsi, G.M.K.; Solar, J.M.; Spears, R. (Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering). Dec 1985. Contract AC22-83PC60050. 27p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014864.

A series of carbon-black composite supports has been fabricated using four carbon blacks of arithmetic mean particle sizes ranging from 12 to 30 nm. By using individual carbon blacks and mixtures of any two, supports have been prepared with various unimodal and bimodal pore size distributions. These supports will be further characterized and used in the preparation of catalysts. A series of experiments has been conducted in order to examine the effect of metal loading on the performance of Mo and CoMo catalysts prepared on a prenitrided mesopore carbon. Nominal loadings were 3, 8 and 15% Mo and 1% Co/3% Mo and 3% Co/8% Mo. The activities of the catalysts for coal asphaltene conversion were determined using tubing bomb reactors. While, in accordance with earlier results, prenitriding enhanced the activity for asphaltene conversion, the effect of increasing the metal loading was to progressively lower the activity. It is suspected that the latter phenomenon may be due to employing too high a temperature for drying after catalyst impregnation, thus causing sintering and poor metal dispersion. FTIR analyses of the unloaded and loaded carbons provided some further evidence that surface nitrogen groups provide preferred sites for the deposition of metal species. The continuous flow reactor system is now operable and preliminary experimental work has been started to evaluate the system. The hydrogenation of toluene over a commercial $CoMo/Al_2O_3$ catalyst is being used as a reference reaction. 10 refs., 10 figs., 1 tab.

47019 **(DOE/PC/60050—10) Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly report for the period 1 January-31 March 1986.** Scaroni, A.W.; Derbyshire, F.J.; Solar, J.M.; Abotsi, G.M.K.; Spears, R. (Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering). Mar 1986. Contract AC22-83PC60050. 22p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014865.

Catalysts have been prepared by the impregnation of different porous carbons with molybdenum-containing precursor com-

pounds using the incipient wetness technique. Two precursors were investigated; a solution of ammonium heptamolybdate (or, in some cases, ammoniumtetrathiomolybdate) in 90% H_2O/10% EtOH; a solution of molybdenumtricarbonyltriacetonitrile in acetonitrile. The fresh catalysts were characterized by x-ray photoelectron spectroscopy. The activities of the sulfided catalysts were measured for thiophene hydrodesulfurization in a continuous flow, atmospheric pressure reactor. The principal findings are that: (1) for a given support and at similar loading, the organometallic precursor confers a much higher activity than the ammonium salt precursors. The increase in lined-out activity can be higher by as much as a factor of 1.6 and (2) with catalysts prepared from molybdenumtricarbonyltriacetonitrile, the highest thiophene conversions were obtained with a high surface area active carbon. However, when (based upon a number of assumptions) the catalysts are compared at similar dispersions and corrected for surface area differences, the most active catalyst was found to be that prepared upon a graphitic support. 3 refs., 1 fig., 4 tabs.

47020 **(DOE/PC/60050—11) Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly reports for the period 1 April-30 September 1986.** Scaroni, A.W.; Derbyshire, F.J.; Solar, J.M.; Abotsi, G.M.K. (Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering). Sep 1986. Contract AC22-83PC60050. 38p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014866.

Characterization studies of sulfided Mo/C catalysts have been continued. The stoichiometry of unsupported molybdenum sulfide, prepared by laboratory procedures, was confirmed to have an S/Mo atomic ratio of 2.0 after reduction in hydrogen at 400°C. Toluene chemisorption has been used as a technique to obtain some indication of the catalyst dispersion and the active surface areas of Mo/C catalysts. The measured toluene surface areas were found to correlate with the catalyst activities for coal asphaltene conversion. Investigations of the effect of hydrogen pressure (500 to 1500 psig) have been made of the activities of an Mo/Ambersorb XE-348 catalyst and an Mo/NH_3 pretreated Ambersorb XE-348 catalyst (pretreated for 1.5 h at 873 K) for coal liquids conversion. The catalyst prepared on the pretreated support showed higher activity for asphaltene conversion. For both catalysts, asphaltene conversion increased and coking propensity decreased with increasing H_2 pressure. Mo/C catalysts have been prepared on five different supports using a molybdenum acetylacetonate precursor. The supports were loaded by adsorption from aqueous solution rather than impregnation by the incipient wetness technique. Preliminary results indicate that some of the catalysts prepared by this procedure possess higher activities for thiophene HDS than those earlier reported using molybdenumtricarbonyltriacetonitrile as a precursor. 30 refs., 9 figs., 7 tabs.

47021 **(DOE/PC/90911—7) Reactivity of heteroatom-containing organics during liquefaction of subbituminous coal: Quarterly technical progress report, June 15, 1987-September 15, 1987.** Knudson, C.L.; Hawthorne, S.B.; Aulich, T.R. (North Dakota Univ., Grand Forks (USA). Energy Research Center). 1987. Contract FG22-86PC90911. 21p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013638.

In order to better understand the reactions of heteroatom-containing organics which occur during liquefaction of subbituminous coal, it is necessary to distinguish between coal-derived and solvent-derived species. A coal-derived liquefaction solvent, A04, was deuterium-labeled by a method developed at the University of North Dakota Energy and Minerals Research Center and found to be stable under liquefaction conditions. The deuterium-labeled A04 was reacted in the presence of unconverted coal (tetrahydrofuran-insoluble material from a previous autoclave liquefaction test), water, carbon monoxide, and hydrogen sulfide at 350°C and 1000 psia for 30 minutes. No significant degradation in isotopic purity was observed in the mass spectra of the individual deuterated species comprising approximately 95 wt % of the deuterated solvent. Tests were also conducted with raw coal under similar liquefaction conditions to determine the amounts of coal-derived compounds evolved, and whether these compounds will undergo deuterium exchange with the deuterated solvent. Distillable products are being analyzed using GC/MS, and soluble and insoluble products are being analyzed using liquid proton and solid state C-13 NMR. Analytical results including product component identification, coal conversion as determined by tetrahydrofuran solubility, and changes observed in NMR spectra are presented. 4 refs., 7 figs., 3 tabs.

47022 **(DOE/PC/90911—8) Heteroatom containing organics during liquefaction, 7/1/87-7/1/88.** Knudson, C.L.; Hawthorne, S.B. (North Dakota Univ., Grand Forks (USA). Energy Research Center). 1987. Contract FG22-86PC90911. 4p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014993.

Coal liquefaction products are difficult to observe in realistic solvents due to solvent masking. Deuteration of the solvent makes individual solvent components uniquely different from unlabelled coal-derived products. Products from the coal can be observed as well as changes in the solvent proton positions in complex solutions. This enables obtaining mechanistic information concerning hydrogen shuttling by known hydrogen donors, and concerning selected compounds which are known to be produced from coal and may be active in liquefaction. Knowledge of the reaction mechanisms will enable the fine-tuning of liquefaction processes to increase the valuable product yields which will improve process economics. The goal of this research is to investigate the fate of heteroatom-containing compounds during low-rank coal liquefaction under mild (less than 350°C) conditions. Comparison of thermal and supercritically extracted products indicates that the coal products observed at 160°C and 250°C are due to devolatilization. Thermal products were observed at 300°C and 350°C. GC-MS analysis of liquefaction products after reaction in deuterated solvent shows the production of simple phenolics and tetralin. Both GC-MS and NMR data indicate that the bridge proton exchange of acenaphthene and fluorene in the original solvent are relatively high during processing. 5 refs.

47023 **(EPRI-AP—5390) ChemCoal Process Development Program: Final report.** Willson, W.B.; Farnum, S.A.; Ness, R.O.; Knudson, C.L.; Cisney, S.J.; Rindt, J.R.; Porter, C.R.; Brolick, H.J. (North Dakota Univ., Grand Forks (USA). Energy Research Center; Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. Contract FC21-83FE60181. 124p. NTIS, PC A06/MF A01 - Research Reports Center, Box 50490, Palo Alto, CA 94303; 1; GPO Dep. File Number DE88000309.

The ChemCoal Process was evaluated to determine product yields, sensitivity of the process to key variables, and operation of a continuous process unit with solvent recovery and recycle. To successfully fulfill the latter, improvements were made in the product solvent recovery system. The improvements resulted in additional patent applications and should improve the process economics. The ChemCoal Process is a low-severity process, where coal is converted at nominally 340°C and an operating pressure of 12.4 MPa (1800 psig) in a phenolic solvent with an alkali promoter and carbon monoxide reducing gas to clean liquid and soil fuels. Reducing gas consumption in hydrogen equivalents was under 2 wt% to produce 50 wt% (maf coal basis) of finely divided ChemCoal solids. The original coal (7000 Btu/lb) contained over 8 wt% ash and 2000 ppM of sodium. The finely divided solid product (14,800 Btu/lb) contained nominally 0.5 wt% ash and 20 ppM sodium. Sulfur and nitrogen contents were also decreased. Due to improvements in recovering product and recycle solvent which reduced severity and added versatility to the process, recycle operation was successful. A preliminary test indicated a fuel oil/ChemCoal solids blend could be used in a diesel engine. 5 refs., 70 figs., 17 tabs.

47024 **(EPRI-AP—5432) Oxygen plants for coal gasification: Experience at the Cool Water GCC [gasification combined cycle] Power Plant: Final report.** Petras, R.A.; Mostello, R.A.; Ko, A.P. (BOC Cryoplants, Murray Hill, NJ (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 101p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920027.

This report presents the results of a study conducted by Airco-BOC for EPRI to assess performance of the Cool Water Oxygen Plant as it relates to the Cool Water Coal Gasification Program's requirements and evaluate alternate supply arrangements

for future larger gasifier based combined cycle power plants. The Cool Water Oxygen Plant is the first application of a dedicated oxygen plant to a commercial sized gasifier based combined cycle power generating facility. Performance of the installation has exceeded the requirements of the Cool Water Program. Performance of the entire oxygen facility is presented at various loadings. Operating ranges of system components are discussed. The oxygen plant back-up system is described and subsequent performance noted. Load following tests were conducted by Airco-BOC and the Cool Water Program to determine the entire facility's operating flexibility. Operating ramp rates achievable on the oxygen plant have exceeded the requirements of the coal gasification facility. The oxygen plant's load-following system is described and results of load-following tests conducted are presented. A supplemental study was conducted to determine alternative oxygen generating facilities to support a nominal 600 MW Texaco gasifier based combined cycle power generation facility. The results of this section of the study are presented. 8 refs., 33 figs., 10 tabs.

47025 **(EPRI-CS—4866) Upgrading Upper Kittanning Seam coal quality to improve power plant performance: Coal cleaning test facility campaign report No. 6.** Moorhead, R.G; Torak, E.R.; Jenko, R.J.; Cavalet, J.R. (Kaiser (Raymond) Engineers, Inc., Homer City, PA (USA); Science Applications International Corp., Homer City, PA (USA). Homer City Office; Electric Power Research Inst., Palo Alto, CA (USA)). Jul 1987. 177p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920563.

A comprehensive Coal Cleanability Characterization to assess the effects of improved coal quality on boiler performance is presented. In 1984, Boston Edison donated Upper Kittanning Seam coal (mined in Nicholas County, West Virginia) for cleaning in commercial-scale equipment at EPRI's Coal Cleaning Test Facility (CCIF). This high volatile A bituminous coal is quite amenable to both water-based and heavy-medium coal cleaning processes due to the low amount of material present in the middle specific gravity range (about 80 wt % of the raw coal reports to the 1.40 specific gravity float fraction; 12 wt % is in the 1.40 to 1.80 specific gravity fractions; and 8 wt % is in the 1.80 specific gravity sink fraction). Only 22% of the total sulfur in the raw coal was pyritic, the only form of sulfur amenable to removal by physical coal cleaning. Therefore, SO_2 emissions potential was reduced only slightly; a result of the increased heating value of the clean coal. The clean coal had between 3.7 and 5.2 lbs of ash/MBtu as compared to 11.9 lbs of ash/MBtu for the raw coal (reducing boiler ash loading by a factor of three). The low slagging factors remained unchanged for the raw and clean coals, while the fouling factors increased from low potential to medium potential once the coal was cleaned. This does not, however, make the Upper Kittanning Seam coal significantly less attractive for firing in pulverized coal utility boilers.

47026 **(EUR—10880-FR) Heating technique in coal carbonization processes - material balances for the coking process.** (Centre de Pyrolyse de Marienau (France)). 1987. 98p. (In French). Centre de Pyrolyse de Marienau (France).

A major factor in the cost effectiveness of the coke manufacturing process is the efficient use of coking by-products, whence the need to know not only the final coke yield but the material balances for tar, benzole and gas as well. The paper describes a small scale pilot study to establish relevant material balances more accurately and in a reproducible form. Calibration was achieved using correlation tests with the coking industry. The installation has been used to establish the material balances for the carbonization of different coals classified according to their volatile matter content. The material balance was also measured in an industrial-scale oven and the equipment is also used to evaluate the effectiveness of unitary operations in the by-product treatment shops. Lastly the Jenkner retort was used to study the effects of temperature and residence time on the composition of the carbonization volatile matter.

47027 **(EUR—10881-IT) Comparison between the behaviour of conventional or pretreated blends in large-scale coking ovens.** Palumbo, L. (Centro Sperimentale Metallurgico, Rome (Italy)). 1987. 63p. (In Italian). Commission of the European Communities.

The aim of the research project described was to consolidate and extend what is known about the influence of oven width on coking process parameters and coke quality. Three series of pilot scale experiments were carried out each in ovens of various widths and different oven wall temperatures were used in the second and third series. Partially pelletized charges were also tested. It was confirmed that an increase in oven width led to a disproportionate increase in coking times and slight differences in the coke properties.

47028 **(EUR—10943-EN) Extended operation of the liquid solvent extraction process.** (British Coal, London (UK)). 1987. 40p. British Coal, London (United Kingdom).

The liquid solvent extraction process is a two-stage direct liquefaction process that is being developed for the conversion of coal to transport fuels. The objectives of this study are to identify more precisely preferred operating conditions and catalysts and to investigate the stability of solvent composition, yield pattern and operation during repeated recycle of the solvent. Six recycle runs were carried out with daily measurements of yields and stream compositions and means of achieving stability were identified. A maximum yield for distillate of 48% was obtained together with 17% hydrogen gas at a hydrogen consumption of 5.9%. These runs were carried out with Point of Ayr coal. In addition 32 UK high volatile coals were subjected to extraction test only, which showed that lower yields of insolubles and hence higher yields of liquids could be achieved.

47029 **(ICTIS-RES—11) Coal research projects. Properties, conversion and combustion - 1987.** (International Energy Agency Coal Research, London (UK)). Apr 1987. 372p. IEA Coal Research, London (United Kingdom).

Details are presented of 2851 research projects either in progress or completed in the last three years on properties of coal and coal products (including physical properties, chemical properties and petrology, purification and upgrading of coal and coal products, coal gasification, hydrogenation and liquefaction of coal, pyrolysis and carbonization of coal; combustion; power generation, and coal products (including coke and by-products). The following information is given for each project where available - organisation carrying out the research, address, telephone number, research workers, project number, collaborating organisations, sponsoring organisations, funding, and time span of project. For many projects, a short summary of objectives of the work is provided.

47030 **(PB—87-215901/XAB) Process description of the SASOL 1 coal-gasification plant. Topical report.** Quass, J.D.; Skinner, F.D. (Radian Corp., Austin, TX (USA)). May 1987. 97p. NTIS, PC A05/MF A01.

The SASOL I coal-gasification plant is part of a highly-integrated industrial complex which produces liquid and solid hydrocarbons, petrochemicals, LPG, and medium-Btu gas by Lurgi gasification followed by gas cleanup and Fischer-Tropsch synthesis. Many of the process units used in this plant are also found in the designs of a number of first-generation coal-gasification plants proposed for this country. Some of these projects have had tests performed at SASOL in order to obtain stream-characterization data for process and control systems design. Unfortunately, much of this data is proprietary. This document provides publicly available information and data with an emphasis on environmental and health aspects. The presentation, which is the sixth in a series of documents, is arranged for comparison of the plant configurations of and EH&S data from other coal-gasification plants included in this study.

47031 **(PB—87-216016/XAB) Thermally initiated carbon-carbon bond-cleavage reactions occurring during coal gasification. Annual report, April 1986-March 1987.** Zabransky, R.F.; Stock, L.M. (Institute of Gas Technology, Chicago, IL (USA)). May 1987. 83p. NTIS, PC A05/MF A01.

See also PB—87-115275.

The objective of the program is to assess the role of pericyclic processes dehydrogenation, retrocyclo addition, and retroene reactions - in the formation of volatile hydrocarbon products within coal particles during gasification. Investigations of Illinois No. 6 coal modified with deuterium and carbon-13 labeled tetralin, indanyl, phenanthryl, and anthryl structural elements were carried

out. The structurally modified coals were pyrolyzed in helium (wire-screen reactor) at a nominal pressure of 2 psig. Analyses of the results from 0-(1- and 2-(5,6,78-tetrahydronaphthyl -5,5,8,8-d4)methyl) and 0-(1- and 2-(5,6,7,8-tetrahydronapthyl-6,7,-d_3)methyl) coals indicated that significantly greater quantities of ethene-d_3 were formed from the latter than from the former. Analysis of the results from 0-(2-(5,6,7,8- tetrahydronaphthyl-6,6,7,7-d)methyl) coal also supported the above observation. The tars evolved during the pyrolysis of these coal samples were also analyzed by ^2H NMR and GC/MS spectroscopies and were found to contain significant amounts of high-molecular-weight aromatic compounds. The possible reaction pathways leading to the formation of the major aromatic compounds identified were elucidated and the mechanisms of such reactions suggested.

47032 **(PB—87-218160/XAB) Electron-transfer mechanisms in thermochemical gasification: a quantitative quantum-mechanical investigation. Annual report, January-December 1986.** Ratner, M.A. (Northwestern Univ., Evanston, IL (USA). Dept. of Chemistry). Apr 1987. 18p. NTIS, PC A02/MF A01.

In the first year of a planned 3-year project, emphasis has been on development and testing of techniques for calculating the rates of the fundamental steps in coal gasification. Since gasification involves either oxidation or reduction of the coal by the reactant, clearly electron-transfer reactions are critical in the overall gasification process. The authors developed both formal and numerical methods for calculating the activation barriers and overall rate constants for the elementary steps in redox gasification. The major success in this first year was the development and testing of a sophisticated computer code for calculating the electronic contributions to the rates of these overall chemical reactions.

47033 **(SVF—235) Study of the thermal vaporization process of Hg from coal.** Lee, Y.H.; Steen, B. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden)). Aug 1986. 46p. (In Swedish). NTIS (US Sales Only), PC A03. File Number DE87753097.

It was suggested in an earlier report that Hg might be vaporized from coal by heating and that this process might be used in order to decrease Hg-emissions from coal firing. This paper reports dynamic experiments concerning the thermal vaporization of Hg from different types of coal. The experiments were performed at various conditions of temperature, heating time, flow rate and gas composition. Equilibrium calculations concerning the thermal dissociations of HgS, which is believed to be the form mainly occurring in coal, were carried out. (authors).

47034 **Solubilization of coal by an extracellular product from Streptomyces setonii 75Vi2.** Strandberg, G.W.; Lewis, S.N. (Oak Ridge National Laboratory, TN). *Journal of Industrial Microbiology;* **1**: No. 6, 371-375(Mar 1987).

Several low-ranked coals were solubilized when placed on the surface of agar cultures of Streptomyces viridosporous T7A and S. setonii 75Vi2. When grown in submerged culture S. Setonii 75Vi2 produced an extracellular component that was capable of solubilizing coals. The extracellular coal solubilizing component had a molecular weight of $<10\,000$ and was heat stable since, after 1 h at 121 C, only 30-40% of the activity was lost. Treatment with any of three proteases also appeared to be ineffective in decreasing activity. These results suggest that coal solubilization by S. setonii 75Vi2 is nonenzymatic. 9 refs.

47035 **Production of high quality liquid fuels from coal by mild pyrolysis of coal-lime mixtures.** Khan, M.R. (Morgantown Energy Technology Center, WV). *Fuel Science and Technology International;* **5**: No. 2, 185-231(1987).

The most recent studies of coal devolatilization processes have emphasized maximization of liquids yield by use of extreme process conditions such as high heating rate. The liquids produced by such processes are often unsuitable for utilization without extensive upgrading. The aim of the study reported here was to optimize product quality by use of relatively mild conditions. Low-temperature devolatilization (slow) heating to 500 to 650 C in a batch reactor) of coal in the presence of CaO (10 to 20 weight percent) can produce a relatively high-quality liquid fuel (containing low sulfur, low oxygen, low viscosity, low Conradson carbon residue, and low pour point). Compared to that occurring in rapid heat-up processes, the residence time of both the liquid and gaseous products is significantly greater in a batch or fixed-bed slow-heating system. It is proposed that this increased residence time facilitates greater secondary reactions of the primary products in the coal bed with the added CaO. The H/C (atomic) ratio of the liquids generated in such a relatively simple devolatilization system can vary between 1.3 and 1.5 for high-volatile coals such as Illinois No.6 or Pittsburgh No. 8. The presence of CaO in the fuel bed markedly reduces H_2S in the gas phase and decreases sulfur and oxygen heteroatoms in the liquids. 24 refs.

0105 By-products

REFER ALSO TO CITATION(S) 47026, 47029, 47172

47036 **(AD-A—182462/2/XAB) Colloidal-dynamics simulations of rheology and stability of concentrated-fuel slurries. Final report, 15 August 1986-15 April 1987.** Wilemski, G. (Physical Sciences, Inc., Andover, MA (USA)). 10 Apr 1987. 56p. (PSI—2009/TR-666). NTIS, PC A04/MF A01.

This report presents the results of a Phase I SBIR project to calculate properties of concentrated colloidal suspensions using computer-simulation methods. Equilibrium and nonequilibrium Brownian dynamics (NEBD) simulations were performed for concentrated aqueous and nonaqueous colloidal suspensions. These are the first calculations of suspension shear viscosity based on NEBD simulations. Stability estimates were also made for sterically stabilized nonaqueous suspensions. The NEBD calculations provide quantitative evidence for the disturbance of the equilibrium structure of the dispersions by shearing. Shear viscosities were calculated as a function of shear rate and particle-volume fraction. Good agreement was obtained with experimental viscosities for comparable systems. The simulation results are sensitive to the type, strength, and range of the potential interactions used to describe the dispersion. These results demonstrate that the NEBD technique is capable of describing the essential features of sheared suspension behavior. They also establish the feasibility and desirability of using NEBD simulation methods as a predictive engineering tool for the design of slurries.

47037 **(EUR—10612-EN,IT) Influence of radial distribution of burden in blast furnaces on the radial pattern of reduction of pig iron elements: experimental investigation using laboratory techniques.** Borgianni, C.; Cresti, V. (Centro Sperimentale Metallurgico, Rome (Italy)). 1987. 51p. (In Italian). Commission of the European Communities.

The paper describes investigations to acquire information on the possibility and means of obtaining low-silica pig iron from the blast furnace without lowering the temperature and with the sulfur level held to acceptable levels. The mechanisms governing the chemical reactions in the softening and melting zone were studied. Two coke-ferrous materials ratios were examined in the laboratory with the two components arranged in such a way as to imitate the positioning occurring in the blast furnace.

0106 Properties

REFER ALSO TO CITATION(S) 47027, 47029, 47031, 47068, 47069, 47109, 48237

47038 **(DOE/FE/60177—2427) Comparison of coal tars generated by pyrolysis of Hanna coal and UCG [underground coal gasification] Hanna IVB coal tars.** Barbour, F.A.; Cummings, R.E. (Western Research Inst., Laramie, WY (USA)). Apr 1986. Contract FC21-83FE60177. 37p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000291.

The compositions of coal tars produced by laboratory and pilot scale apparatus have been compared to those produced during underground coal gasification (UCG) experiments at Hanna, Wyoming. Four coal tars were generated by pyrolysis using the block reactor and the laboratory reference retort, and a fifth coal tar was composited from products produced by UCG. Coal tars were sepa-

rated into chemically defined fractions and were characterized by gas chromatography. Specific compounds were not identified, but rather fingerprinting or compound-type profiling was used for identifying similarities and differences in the product tars. This permitted the evaluation of the different methods of tar production with respect to one another. The UCG coal tars appeared to have undergone more secondary cracking than the pyrolytic products. The coal tar products from the laboratory reference retort appear to be more indicative of the coal's chemical structure. Products from the block reactor contained lesser amounts of the lighter boiling material. In addition there is organic sulfur contamination as indicated by the large amount of sulfur present in the product tar from the block reactor. 11 refs., 16 figs., 11 tabs.

47039 **(DOE/PC/71257—T12) Automation of a hydrogen probe for determination of hydrogen solubilities in coal liquids solvents.** Karlezi, C.R.A. (Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering). 1987. Contract FG22-84PC71257. 195p. NTIS, PC A09/MF A01; 1; GPO Dep. File Number DE87013646.

The Hydrogen Probe Equipment developed in our laboratory was automated in order to improve the data acquisition of the variables involved in the process: temperatures, pressures and the time of travel for the mercury bead. The equipment was tested by studying the hydrogen-tetralin, hydrogen-tetralin-methane and hydrogen-tetralin-ethane systems. A 300-ml autoclave equipped with a magnetically driven agitator was used as an equilibrium cell. The in-situ hydrogen probe was used to measure the hydrogen partial pressure in the mentioned systems. The partial pressure of methane was varied from 0 to 1000 psi while the temperatures were 325°C and 375°C. The ethane partial pressure was varied from 0 to 585 psi and the temperatures were 360°C and 395°C. For the hydrogen-tetralin system, the temperatures were 350°C and 390°C. Results from the hydrogen-tetralin system show good agreement when compared with literature data. As they show, the solubility of hydrogen in tetralin increases when the temperature and pressure are increased. For the ternary systems, it was found that the hydrogen solubility in tetralin increased when the partial pressure of the third component added (methane or ethane) was increased and the partial pressure of hydrogen was held constant. The experimental values for the K-value for hydrogen and tetralin where compared with the predicted value by using the correlations proposed by Chao and Seader in 1961 for tetralin and the correlation proposed by Sebastian et al. in 1980 for hydrogen. The experimental values show a good agreement with the values predicted by using these correlations. Besides the experimental work, a commercial hydrogen probe system was constructed to be used in the plant that Catalytic Inc. operates in Wilsonville, Alabama. 41 refs., 65 figs., 32 tabs.

47040 **(EUR—10942-DE) Raw material and technological properties of hard coal as a function of total reflectance.** (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 29p. (In German). Steinkohlenbergbauverein, Essen-Kray (Germany, F.R.).

Processes for the texture analysing system (TAS) for automatic phase analysis and consequently microlithotype analysis of coal and for assessing hydrogenation and coking properties from the total reflectance of coal were developed and tested. It emerged that although automatic microlithotype analysis is possible, the resulting values are not particularly consistent with those obtained by conventional methods. The total reflectance of coal provides reliable information on the degree of transformation during hydrogenation, with macerals with the same reflectance being credited with the same reactivity. It is possible to distinguish between reactive and inert parts. In assessing the coking properties of coal, out of the parameters studied (coking capacity, volatile matter, mean vitrinite reflectance, M40 and M10) a correlation with total reflectance was established only in the latter two cases.

47041 **(N—87-24565) Tribological properties of coal slurries.** Fusaro, R.L.; Schrubens, D.L. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1987. 27p. (NASA-TM—89930; E—3634; NAS—1.15:89930; CONF-871009—2). NTIS, PC A03/MF A01.

From American Society of Lubrication Engineers and the American Society of Mechanical Engineers lube conference; San Antonio, TX, USA (5 Oct 1987).

A pin-on-disk tribometer was used to study the tribological properties of methyl alcohol-coal slurries. Friction coefficients, steel pin wear rates and wear surface morphological studies were conducted on AISI 440C HT and M-50 bearing steels which were slid dry and in solutions of methyl alcohol, methyl alcohol-fine coal particles, and methyl alcohol-fine coal particles-flocking additive. The latter was an oil derived from coal and originally intended to be added to the coal slurry to improve the sedimentation and rheology properties. The results of this study indicated that the addition of the flocking additive to the coal slurry markedly improved the tribological properties, especially wear. In addition, the type of steel was found to be very important in determining the type of wear that took place. Cracks and pits were found on the M-50 steel pin wear surfaces that slid in the coal slurries while 440C HT steel pins showed none.

47042 **(PB—87-211975/XAB) Physical and chemical properties of finely ground de-ashed coal. Final report, April 1984-February 1987.** Hill, A.H.; Anderson, G.L.; Zabransky, R.F.; Chan, I.H.; Chao, S.S. (Institute of Gas Technology, Chicago, IL (USA)). Feb 1987. 148p. NTIS, PC A07/MF A01.

See also PB—86-163748.

This report presents the results of a laboratory- and bench-scale program conducted to determine the physical and chemical properties, including gasification reactivity, of three bituminous coals - Pittsburgh No. 8, Illinois No. 6, and Kentucky No. 9. Before testing was initiated, a survey of the chemical and physical coal-cleaning processes was conducted. Based on the results of this study and a ranking procedure developed, two processes were selected - The Otisca-T process (a physical coal-cleaning process), and the TRW Gravimelt process (a chemical coal-cleaning process) - for evaluating the effects of coal cleaning on the physical and chemical properties of the three coals selected. The physical properties measured included: particle-size distribution, surface area, pore structure, true particle and bulk densities, and fluidization characteristics. The chemical properties measured were ultimate and proximate analyses, free-swelling index, ash-fusion temperature, ash composition, and coal devolatilization and coal and char gasification characteristics. The coal devolatilization and char-gasification characteristics were determined with and without potassium carbonate catalyst. Char-gasification kinetic studies were conducted in laboratory-scale TGA equipment, and selected coal-gasification tests were conducted in continuous bench-scale equipment.

47043 **(PB—87-218871/XAB) Characterization of coal macerals by high-resolution supercritical fluid chromatography. Annual report, May 1986-April 1987.** Lee, M.L. (Brigham Young Univ., Provo, UT (USA). Dept. of Chemistry). Jul 1987. 69p. NTIS, PC A04/MF A01.

See also PB—87-102158.

The pyridine extracts of three new vitrinite-rich coals of different rank (Wyodak subbituminous, Illinois No. 6 high volatile bituminous, and Upper Freeport medium volatile bituminous) were fractionated into chemical classes and analyzed by capillary-column gas chromatography-mass spectrometry. While there exist basic structural similarities among all of the coal extracts, there are structural changes that can be correlated primarily with rank. Di- and triterpenoid compounds are present in significant concentration in the low rank coals, while they are nearly absent in the high-rank coals. In contrast, aromaticity increases in the high-rank coals, with a trend to larger condensed-ring systems. Reduction methods are being applied to depolymerize the coal matrix in order to determine how representative coal extracts are of the macromolecular coal structure. Supercritical fluid chromatographic techniques are being developed for the application to high-molecular-mass coal fragments that are not amenable to analysis by gas chromatography-mass spectrometry.

47044 **Polycyclic aromatic hydrocarbon dermal tumorigens.** Griest, W.H.; Tomkins, B.A.; Buchanan, M.V.; Jones, A.R.; Reagan, R.R. (Oak Ridge National Laboratory, TN (USA)). *Fuel;* **66**: No. 8, 1046-1049(Aug 1987).

Two petroleum crude oils were distilled into two sets of fractions patterned after the boiling ranges of crude coal-derived liquids, including a heavy oil/heavy distillate (bp > 232 C/450 F) and a high-boiling vacuum gas oil (bp > 343 C/650 F). Samples of these distillates and two naturally occurring, undistilled, high-boiling, petroleum-derived crude oils were analysed for selected four-to six-ring polycyclic aromatic hydrocarbon (PAH) dermal tumorigens. The PAH were isolated using semipreparative-scale high performance liquid chromatography, and quantitated using gas chromatography-mass spectrometry in the single-ion monitoring mode. The isomer distributions of these PAH in petroleum- and crude coal-derived samples exhibiting similar boiling ranges were different, and the concentrations of the PAH were one to two orders of magnitude greater in the coal-derived liquids. Their distributions and concentrations in the petroleum-derived samples were more like those in hydrogenated coal liquids than those in the crude coal liquids. 22 refs., 2 tabs.

47045 **Sulphur in coal by programmed-temperature oxidation.** LaCount, R.B.; Anderson, R.R.; Friedman, S.; Blaustein, B.D. (USDOE Pittsburgh Energy Technology Center, PA). *Fuel;* **66**: No. 7, 909-913(Jul 1987). (CONF-860411—).

From 1. international conference on separations science and technology; New York, NY, USA (15 Apr 1986).

A controlled-atmosphere, programmed-temperature, oxidation apparatus has been constructed and used to characterize organic-sulphur distribution in coals, partially desulphurized coals, and model systems. Samples were diluted with WO_3 and heated, in a stream of Ar containing 10% O_2, at a programmed-temperature increase of 3 C min^{-1}. Concentrations of SO_2, CO_2, CO, O_2 and H_2O in the effluent gas were continuously measured until the runs were completed at 1000 C. Evolution patterns produced by the oxidation products characterize the coal and, upon integration, provide total C-H-S analyses consistent with classical coal analysis methods. The SO_2 derived from coal pyrite evolves with a maximum at about 430 C, and that from the organic portion of coal produces principal evolution maxima at about 320 C (attributed to non-aromatic coal structures) and at about 480 C (attributed to aromatic structures). During oxidation the H/C ratio decreases with increasing temperature to about 0.6-0.7 at 400 C. The NMR spectrum of residue isolated after oxidation up to 400 C shows a sharp decrease in aliphatic carbon compared with the original coal. 9 refs., 7 figs., 5 tabs.

47046 **Applications of transmission electron microscopy to coal chemistry.** Wert, C.A.; Hsieh, K.C.; Tseng, B.H.; Ge, Y.P. (University of Illinois, Urbana). *Fuel;* **66**: No. 7, 914-920(Jul 1987). (CONF-860411—).

From 1. international conference on separations science and technology; New York, NY, USA (15 Apr 1986).

Transmission electron microscopy can be applied to several aspects of coal chemistry. First, examination can be made of the structure and characteristics of the mineral constituents. Second, the concentration and distribution of organic elements can be determined. These techniques are closely related to methods by which materials scientists have examined alloys and ceramic materials for many years. This paper describes the methods, shows typical applications and indicates the relation between the measurements and progress in electron microscopy generally. 25 refs., 10 figs., 1 tab.

47047 **Negative ion processes for the unambiguous identification of polycyclic aromatic compounds.** Buchanan, M.V.; Wise, M.B. (Oak Ridge National Laboratory, TN). *Fuel;* **66**: No. 7, 954-959(Jul 1987). (CONF-860411—).

From 1. international conference on separations science and technology; New York, NY, USA (15 Apr 1986).

Electron capture negative ion processes have been applied to the determination of polycyclic aromatic hydrocarbons in complex mixtures using both chemical ionization mass spectrometry and a newly developed gas chromatographic detector. The negative ion chemical ionization mass spectrometric technique allows isomeric PAH compounds to be differentiated on the basis of relative electron affinities. Compounds which have electron affinities > 0.5 e.V form molecular anions while compounds with lower electron affinities are not ionized. The new gas chromatographic detector also enables isomeric PAH to be differentiated as a function of relative electron affinities. This detector exhibits continuous tunability, allowing the gas phase reactions to be controlled to a greater degree than in the NICI experiment. This flexibility allows a wider variety of compounds to be differentiated using the GC detector. Additionally, the GC detector may be operated either as a conventional electron capture detector or as an argon ionization detector, which has virtually universal response to organics. 28 refs., 3 figs., 1 tab.

47048 **Rapid dissolution technique for colorimetric determination of nitrogen in coals.** Norton, G.A.; Adams, N.S.; Markuszewski, R.; Brayton, S.V. (Iowa State University, Ames). *Fuel;* **66**: No. 7, 996-1001(Jul 1987). (CONF-860411—).

From 1. international conference on separations science and technology; New York, NY, USA (15 Apr 1986).

A simple and rapid method for the colorimetric determination of total nitrogen in coal has been tested on several coals digested under various conditions. The method consists of initial carbonization of the coal sample with H_2SO_4 followed by digestion using continuous-flow addition of a mixture of 50% H_2O_2 plus concentrated H_2SO_4. Nessler's reagent is added for colour development for the subsequent spectrophotometric determination of ammonia nitrogen. Maximum nitrogen recovery was obtained by using boiling times of 4 min or more during sample carbonization, H_2O_2:H_2SO_4 ratios of 4:1 to 9:1, and digestion reagent volumes of 20-40 cm^3. Altering the heat setting on the digestion apparatus substantially changed digestion times but did not significantly affect nitrogen values obtained. Using the optimum digestion conditions, results for nitrogen in seven different coal samples were comparable with those obtained by conventional determinations using an instrumental CHN analyser. The precision of this rapid dissolution technique was good and appeared to be better than that of the instrumental analyser for many of the coals studied. 24 refs., 3 figs., 5 tabs.

47049 **Experimental electron beam microanalytical procedure for determining oxygen in coal.** Younkin, K.A.; Norton, G.A.; Straszheim, W.E.; Markuszewski, R. (Ames Lab., IA). *Fuel;* **66**: No. 7, 1002-1007(Jul 1987). (CONF-860411—).

From 1. international conference on separations science and technology; New York, NY, USA (15 Apr 1986).

The standard ASTM procedure for determining levels of organic oxygen in coals is an indirect determination which has cumulative errors. As yet, there is no fast, simple, accurate, direct method for determining the organic oxygen content of coal. Although various techniques employing oxidation, reduction or fast-neutron activation (FNA) are currently used to determine organic oxygen in coal, these methods can be time consuming or relatively complex. In addition, corrections must often be made for the inorganic oxygen from the mineral matter. In this study, the organic oxygen levels in coal are directly determined by scanning electron microscopy coupled with wavelength-dispersive X-ray analysis (SEM-WDX). Previously, a similar technique has been used successfully to quantify organic sulphur levels in coal. The SEM-WDX method provides data for the organic oxygen content after chemical screening with energy-dispersive X-ray analysis to avoid the inorganic oxygen components. Four coals were analysed for oxygen by the SEM-WDS method and results were compared with values from the ASTM and FNA methods. One coal gave SEM-WDX results similar to the ASTM and FNA values, while the other three coals gave results significantly lower than the ASTM or FNA values. Sample volatilization, oxygen standards, matrix correction routines and other analytical conditions are discussed as potential causes for the lower SEM-WDX results. 37 refs., 2 figs., 3 tabs.

47050 **Chemical composition and toxicological activity of liquefaction materials derived from different feed coal ranks.** Wright, C.W.; Chess, E.K.; Stewart, D.L.; Mahlum, D.D.; Dauble, D.D. (Pacific Northwest Laboratory, Richland, WA). *Fuel Processing Technology;* **16**: No. 3, 227-243(Jun 1987).

Samples of recycle-solvent from the bottoms recycle mode of the EDS direct coal liquefaction process using bituminous, subbituminous, and lignite coal feeds were chemically characterized and tested for toxicological response. The H-Coal heavy fuel oils derived from bituminous and sub-bituminous coals were also ana-

lyzed. Chemical methods of analysis included adsorption column chromatography, high-resolution gas chromatography, gas chromatography/mass spectrometry, and low-voltage probe-inlet mass spectrometry. The toxicological activity of selected samples was evaluated using the standard histidine reversion microbial mutagenicity assay, an initiation/promotion assay for mouse-skin tumorigenicity, and a static bioassay with Daphnia magna for aquatic toxicity of the water-soluble fractions. Both materials derived from the bituminous coals had the following chemical characteristics as compared to their sub-bituminous coal and/or lignite-derived counterparts: higher concentrations of polycyclic aromatic hydrocarbons (PAH), nitrogen-containing polycyclic aromatic compounds, and hydroxy-substituted PAH; lower concentrations of aliphatic hydrocarbons; and a generally increased molecular weight distribution of approximately ten atomic mass units. Toxicological testing indicated a general trend of increased biological activity of the coal liquefaction products with increasing feed coal rank. 25 refs.

47051 **High temperature solid state CP-MAS-NMR of bituminous coals.** Sprecher, R.F.; Retcofsky, H.L. (Pittsburgh Energy Technology Center, PA). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—).

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

High resolution C-13 NMR in the solid state can provide structural information about organic polymers even when they are trapped in an inorganic host. Cross polarization and magic angle spinning (CP-MAS) have been used extensively to achieve high resolution C-13 NMR spectra of solid polymers. The technique has been limited to temperatures below 100°C due to limitations of available probes. The CP-MAS NMR technique has been extended to include measurements at temperatures up to 300°C. The considerations which lead to a probe design which allows such measurements will be presented, as will measurements on bituminous coals at 300°C. The probe design should find applications in other areas of geochemistry such as studies of the thermolysis of kerogen in source rock.

47052 **Solid ^{13}C-NMR relaxation study of coals.** Axelson, D.E.; Botto, R.E. (Argonne National Lab., IL). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—). Contract W-31-109-ENG-38.

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

Inversion recovery ^{13}C spin-lattice relaxation (T_1/sup C/) measurements have been performed at two magnetic field strengths (2.3 and 4.7 tesla) on a series of Canadian coals and Argonne Premium Coals varying in rank. In general, carbon relaxation of the aliphatic and aromatic resonance bands in the coal spectra can be approximated by the sum of two decaying exponential components. The shorter component generally decays with a time constant less than 1 s while the longer component varies between 4-25 s. The variation of T_1/sup C/ with the magnetic field strength and with various coal-rank parameters, as well as the use of T_1/sup C/ relaxation discrimination to identify the structures of short and long relaxing components will be discussed.

47053 **Double cross polarization (DCP)/MAS NMR of coal derivatives: a view of the reaction center using a cross polarization filter.** Hagaman, E.W.; Woody, M.C. (Oak Ridge National Lab., TN). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—). Contract AC05-84OR21400.

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

The CP/MAS ^{13}C-NMR methodology for acquisition of high resolution solid state spectra is now routine and provides important statistical structure parameters on organic components of solid fossil fuels. With few exceptions this information is not at the functional group level and does not illuminate those features of the coal which control chemical reactivity. They are developing a multi-faceted approach which combines selective chemical modification of coals that introduce sensitive, naturally rare NMR isotopes, /sup i/X, and DCP/MAS-NMR analysis. This spectroscopic method limits the detection of carbon resonances to those centers in the immediate vicinity of the /sup i/X atom. In their initial studies they have chose /sup i/X = ^{31}P. From model studies the sensitive sphere about ^{31}P has a ca. 3 angstrom radius. Carbon sites one and two bonds removed from the phosphorus atom are contained within this sphere. The chemistry may be tailored to label a variety of distinguishable sites. In principle, this integrated approach specifically identifies chemically defined reactive centers in the coal.

0108 Waste Management

REFER ALSO TO CITATION(S) 47025, 47356, 47358, 47361, 47627, 48375

47054 **(ANL/CNSV-TM—187) Two-dimensional modeling of fossil-fueled power plant behavior when using CO_2-O_2 or CO_2-H_2O-O_2 mixtures, instead of air, to support combustion.** Richter, W.; Li, W.; Payne, R. (Energy and Environmental Research Corp., Irvine, CA (USA); Argonne National Lab., IL (USA)). Jun 1987. Contract W-31109-ENG-38. 474p. NTIS, PC A20/MF A01; 1; GPO Dep. File Number DE87014259.

This report is one of several that present results obtained by an Argonne National Laboratory program, Systems Analysis for Waste Carbon Dioxide Utilization. The program includes engineering research - as well as economic and institutional assessments - dealing with issues related to the supply and use of waste carbon dioxide. Studies of supply options emphasize a new method, being investigated by Argonne, of recovering the carbon dioxide that now escapes from smokestacks; this method would avoid the emission of sulfur oxides and nitrogen oxides believed to be precursors of acid rain. Studies of use options relate primarily to increased exploitation of carbon dioxide for enhanced oil recovery. The new method that Argonne National Laboratory is investigating differs from conventional approaches, which attempt to separate carbon dioxide from flue gas after the fuel has been burned in air. The flue gas produced after such a burn is composed principally of nitrogen and a smaller amount of water vapor, a small amount of (excess) oxygen, and oxides of sulfur and nitrogen depending on the fuel - in addition to the carbon dioxide. The sulfur oxides interfere with the separation of carbon dioxide and thus they (primarily sulfur dioxide) must be removed first. The higher the concentration of sulfur oxides, the more expensive the conventional methods of removing those oxides become.

47055 **(EPRI-EA—5321) Chemical characterization of fossil fuel combustion wastes: Final report.** Ainsworth, C.C.; Rai, D. (Pacific Northwest Lab., Richland, WA (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. Contract AC06-76RL01830. 136p. NTIS, PC A07/MF A01 - Research Reports Center, Box 50490, Palo Alto, CA 94303; 1; GPO Dep. File Number DE87014223.

A limited chemical characterization of fossil-fuel-combustion wastes [fly ash, bottom ash, flue gas desulfurization (FGD) sludge, and oil ash] was conducted to measure the important chemical characteristics that are implicated in the leaching behavior of elements from different wastes disposed of in landfills or impoundments. Based on these measurements, eleven power plants have been selected to obtain waste samples for in-depth experimental studies. The chemical characterization consisted of (1) total chemical analysis by energy-dispersive x-ray fluorescence (XRF), (2) a Paar bomb hot-water (105°C) extraction, (3) a concentrated HNO_3 acid extraction, and (4) leaching evaluation of selected samples by Extraction Procedure (EP) and the Toxicity Characteristic Leaching Procedure (TCLP). Thirty-nine fly ash, 40 bottom ash, 11 FGD sludge, and 3 oil ash samples were studied. Considerable differences in total chemical composition and extracted element concentrations were observed between the four waste types. However, coal fly ash and bottom ash did show marked similarity in composition and variability of the nonvolatile inorganic elements (e.g., Al, Ca, Fe, Si). The volatile elements (e.g., As, B, Cl, F, S, Se) were concentrated in the fly ash or FGD sludge. Total concentrations of several elements (e.g., As, B, Pb, Zn) appeared to vary with the coal type used in the burning process.

47056 **(ICTIS-RES—13) Coal research projects. Supply, transport and the environment - 1987 supplement.** (International Energy Agency Coal Research, London (UK)). Apr 1987. 84p. IEA Coal Research, London (United Kingdom).

Details are presented of 490 research projects either in progress or completed in the last three years on: coal industry, economics and policy, transport and handling, waste management and pollution control environmental aspects, and health and safety. The following information is given for each project where available: organisation carrying out the research, address, telephone number, research workers, project number, collaborating organisations, sponsoring organisations, funding and duration. For many projects there is a short summary of the work being carried out.

47057 **(PB—87-207049/XAB) Assessment of acid mine drainage in the Missouri River Basin for mutagenic and clastogenic activities. Final technical completion report.** Hufham, J.B.; Hemman, L.; Dawson, J.; Hamlett, S.; Terkonda, R. (Missouri Univ., Columbia (USA). Water Resources Research Center). 30 Sep 1982. 17p. NTIS, PC A02/MF A01.

A slurry of bituminous coal in water and a sample of acid-mine-drainage water showed no mutagenic activity in the Ames test. Extraction of Wyoming and Missouri coal with acid, base, and distilled water produced fractions that also did not show any mutagenic activity, even at a 50-fold concentration of the extracts. The Ames test fells short of the requirements for a quick, easy, inexpensive method for routine screening of mine effluents for the following reasons: culture contamination, replicate variation, and toxicity of samples.

47058 **(PB—87-215372/XAB) Ecological recovery after reclamation of toxic spoils left by coal surface mining. Phase 2. An assessment of environmental changes following intensive remedial treatments. Report for July 1975-September 1981.** Zarger, T.G.; Scanlon, D.H.; Nicholson, C.P.; Brown, S.R.; Starnes, L.B. (Tennessee Valley Authority, Norris (USA). Div. of Land and Economic Resources). Jul 1987. 144p. NTIS, PC A07/MF A01.

This study involves a selected watershed in which surface mining and unsuccessful reclamation efforts in the early 1970s resulted in adverse environmental impacts. Work on the east Tennessee problem mine sought to correct reclamation deficiencies by applying land stabilization treatments and then evaluating their effectiveness by measuring the degree of recovery of the affected terrestrial and aquatic ecosystems. Conditions documented during the mining and reclamation, and those following restorative treatments, provide a measure of ecological recovery. Evaluations on environmental effects cover vegetation, soils, water quality, aquatic macroinvertebrates, fish, small mammals, birds, and sedimentation.

47059 **(PB—87-215778/XAB) Characterization, extraction, and reuse of coal-gasification solid wastes. Volume 3. Technical and economic feasibility of bulk utilization and metal recovery for ashes from an integrated coal-gasification facility. Final report, April 1983-June 1986.** Manz, O.E.; Hassett, D.J.; Laudal, D.L.; Ellman, R.C. (North Dakota Univ., Grand Forks (USA). North Dakota Mining and Mineral Resources Research Inst.). Jun 1986. 209p. NTIS, PC A10/MF A01.

Coal-gasification waste products, including those from Lurgi gasification, have different properties from the combustion ashes, especially with respect to mineralogy. To date, comparatively little effort has been directed toward the investigation of bulk utilization or metals extraction. This project was directed towards correction of that deficiency by matching properties of the Great Plains Gasification Plant gasifier ash and the Antelope Valley Power Plant combustion explored: mineral wool; sulfur concrete; high-flexural-strength ceramics; ceramic glazed wall tile and vitrified floor tile; dual concrete replacement; road stabilization; blended cement; and recovery of aluminum. Mineral wool of similar physical character to commercial wool and at lower potential cost was produced using the ashes from the GPGA complex. Sulfur concrete utilizing 80% ash and 20% modified sulfur developed flexural and compressive strengths in excess of 2250 and 6000 psi, respectively. A vitrified ceramic product with flexural strength above 7800 psi was produced from a mixture of 50% AVS scrubber ash 45% sand, and 5% clay. By using a total ash mixture of 26% gasifier ash and 74% combustion ash, a very satisfactory, economical, and durable roadbase material was developed. The replacement of up to 50% of the cement in concrete with AVS scrubber ash produces higher strength. A modified lime-soda sinter process for aluminum recovery was developed, but is not economical.

47060 **(PB—87-215984/XAB) Characterization and disposal of coal-gasification waste products. Phase 2. Topical report, 1 May 1984-30 April 1986.** Spaite, P.W.; Dalrymple, D.A.; Page, G.C. (Radian Corp., Austin, TX (USA)). Apr 1987. 145p. (DCN—87-218-028-02). NTIS, PC A07/MF A01.

The Gas Research Institute has sponsored a program to collect, organize, and evaluate information relevant to controlling potential environmental, health and safety (EH&S) impacts of coal gasification. A technology assessment was conducted using previously developed methodology, and the results were used as a basis for the development of GRI Coal Gasification EH&S Information System and a computerized information management program. In addition, in-depth studies were initiated dealing with selected aspects of the technology. Specifically, attention was focused on analysis of selected medium- and high-Btu coal-gasification processes, liquid redox sulfur recovery, wastewater treatment, codisposal of solid wastes, strategic sampling and analysis, pollution-control-costs analysis for coal gasification, cost estimation for restoration of subsurface waters associated with underground coal gasification, and regulatory analysis. These tasks have led to a detailed investigation in codisposal of solid and liquid wastes, an in-depth study of sulfur-recovery technology using a bench-scale reactor, and search for alternate technology for controlling underground coal-gasification pollutants.

47061 **(SVF—233) Recycling of rest products from SO/sb 2/-separation in low NO/sub (x)/ burners .** Karlsson, H. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden)). Jun 1986. 19p. (In Swedish). NTIS (US Sales Only), PC A02/MF A01. File Number DE87753095.

A study was undertaken of ash products obtained from limestone injection on a low NO/sub (x)/ burner. The investigation was focused on the use of the ashes as additives for the cement production. It was established that the type of ashes studied show the same behaviour as other types of ashes. Furthermore, the added limestone generates calcium sulfate. The gypsum added to cement products can thus be replaced to some extent by the contribution from the ash products. Any conclusions concerning chlorine can not be drawn, due to the low chlorine content of the coal fired. The chemical analyses revealed high levels of quartz, i e crystalline SiO/sb2/. Furthermore, high concentrations of CaO may be anticipated. These aspects have to be considered in further investigations, especially when considering potential problems in the working environment.

47062 **(SVF—238) Emission measurements for wet-dry flue gas cleaning.** Karlsson, H. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden)). Oct 1986. 58p. (In Swedish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753099.

A two-year test program has been conducted on a lime based spray dry scrubber treating all the flue gas from a 150 MW coal fired boiler. The flue gas cleaning (FGC) system consists of an ESP followed by a spray dryer and a fabric filter system. Measured data focusing on the fate of particulates, 10 trace metals, HCL, HF, SO/sb3/, NOx and polyorganic matters (POM) were analysed in light of the potential for pollution control. The concentration of ten trace metals were measured in 7 streams of solids entering and exiting the boiler and the FGC system. The removal of hydrochloric acid was determined when burning mixtures of British, Polish and Russian coals. The removal efficiency was shown to be constant up to about 25 ppm HCl, after which the removal increased strongly with inlet concentration. The behaviour may be a result of an autocatalytic mechanism. Individual data points indicate up to greater than 85 percent removal of HF. SO/sb3/ was measured by means of controlled condensation and by using the isopropanol method. A considerable discrepancy between the two methods was observed.

Attempts were made to identify 130 different POM species ahead of the flue gas cleaning system, as well as downstream from the fabric filter system. In addition, Ames' test was applied on particulates and gaseous species collected from the flue gases.

47063 **(SVF—239) Reduction of NO/sub (x)/ through reburning, using pulverized wood or peat.** Blomqvist, G.; Berge, N. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden)). Oct 1986. 50p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753100.

Reburning is demonstrated to be an effective method for reduction of NO/sub (x)/ emission from pulverized coal combustion. With this technique, part of the fuel is supplied after the main combustion zone to produce a reducing environment. Final combustion is achieved with an extra air supply after the reburning zone. Natural gas is the best reburning fuel according to Japanese experience and will always reduce the NOsub(x) emisson by at least 50 percent. With nitrogen containing reburning fuels NOsub(x) levels below 200 ppm are difficult to achieve due to NOsub(x) formation by the reburning-fuel nitrogen. Neither wood nor peat have been demonstrated as reburning fuels. Pulverized wood seems, due to the low fuel nitrogen, be very effective. Based on experience with lignite, pulverized peat may also have a potential to reduce NOsub(x) emission significantly. The combustion properties of both these fuels is advantageous in this application. (authors).

47064 **Economic incentives for the reduction of sulfur dioxide emissions.** Streets, D.G.; Veselka, T.D. (Argonne National Laboratory, IL (USA)). *Energy Systems and Policy;* 11: No. 1, 39-59(1987).

The policy option of achieving reductions in sulfur dioxide emissions from electric utility power plant through economic incentives is examined. Acid rain control is the driving force for such policies, and the Aspin bill (H.R. 4483) from the 98th Congress is used as a base case in this work. Various combinations of a tax on sulfur in coal, a rebate for sulfur dioxide removal, and subsidy of emission control technology costs are studied. Mechanistic understanding of the effects of economic incentives on utility decision making is obtained through detailed examination of a prototype generating unit. The AIRCOST model is used to quantify total utility and societal costs and emission reductions likely to be achieved through such programs. The essential feasibility of the approach is demonstrated and recommendations are made for optimum program structure and parameter values necessary to achieve various policy objectives. 13 refs.

47065 **Leaching studies of solid wastes generated from fluidized bed combustion of low-rank western coals.** Henke, K.R.; Zobeck, B.J.; Moretti, C.J.; Mann, M.D. (Univ. of North Dakota Energy Research Center, Grand Forks, ND). pp 954-959 of Proceedings of the 1987 international conference on fluidized bed combustion: FBC comes of age. Mustonen, J.P. New York, NY; American Society of Mechanical Engineers (1987). (CONF-870540—).

From 9. international conference on fluidized bed combustion; Boston, MA, USA (3 May 1987).

According to long-term projections, the utilization of low-rank coals will continue to increase in the future. As such, there will be significant increases in the quantities of low-rank coal-derived wastes. Present federal regulations, which include the Resource Conservation and Recovery Act of 1976 (RCRA) and additional amendments, exempt coal wastes from hazardous regulations. All coal wastes, however, must comply with various state requirements for environmentally acceptable disposal methods. Fluidized bed combustors, which are experiencing rapid commercialization, could be a significant source of future coal-derived wastes. Six composite fly ashes were generated from the fluidized bed combustion (FBC) of Gibbons Creek (Texas lignite), Navajo (New Mexico subbituminous), and Sarpy Creek (Montana subbituminous) coals. The wastes were produced in a pilot-scale 0.46 by 0.46 meter bubbling FBC. Two combustion tests were conducted on each coal, one with limestone addition and the other with ash re-injection. The properties of the ashes were determined by X-ray fluorescence, X-ray diffraction, and standard batch leaching tests. By present EPA standards, all of the fly ashes were found to be non-hazardous.

47066 **Alkali measurement in PFBC and its control by a granular bed of activated bauxite.** Lee, S.H.D.; Myles, K.M. (Argonne National Lab., Argonne, IL). pp 793-801 of Proceedings of the 1987 international conference on fluidized bed combustion: FBC comes of age. Mustonen, J.P. New York, NY; American Society of Mechanical Engineers (1987). (CONF-870540—).

From 9. international conference on fluidized bed combustion; Boston, MA, USA (3 May 1987).

A fixed granular bed of activated bauxite has been installed with a pressurized fluidized-bed combustor (PFBC) to capture the alkali vapor in PFBC flue gas. An Ames alkali analyzer was also installed to measure the alkali concentration of the both filtered and unfiltered PFBC flue gas on a real-time, on-line basis. The alkali (Na + K) vapor concentration was measured and suggested to be < 10 ppbW for combustion of Pittsburgh Sewickley seam coal and Tymochtee dolomite. In associated laboratory tests, a heated ($> 700^{\circ}C$) stainless steel tube was found to capture NaCl and KCl vapors, suggesting that the stainless steel components used in the PFBC/alkali sorber could be a sink of alkali vapors in PFBC flue gas. In a test with a known amount of NaCl vapor doped into the flue gas, the activated-bauxite sorber showed $> 99\%$ capture of the doped NaCl vapor.

0109 Environmental Aspects

REFER ALSO TO CITATION(S) 47014, 47030, 47056, 47060, 47064, 47065, 47070, 48314, 48321, 48377

47067 **(PB—87-204558/XAB) Mined-land subsidence impacts on farmland with potential application to Illinois: a literature review. Information Circular/1987.** Veith, D.L. (Bureau of Mines, Twin Cities, MN (USA). Twin Cities Research Center). 1987. 23p. (BM-IC—9124). NTIS, PC A02/MF A01.

Library of Congress catalog card no. 86-600227.

The report summarizes a Bureau of Mines review of selected literature on the effects of subsidence due to high-extraction underground coal mining of farmland areas. The data are presented for consideration in evaluating the subsidence effects due to similar mining techniques on the prime farmland areas of Illinois. The main subsidence concern is flooding, as caused by the lowering of the ground surface, and the subsequent effects on crop production. Positive drainage must be maintained in the farmlands, and the need exists for extensive regional planning by the mining and agricultural industries to maximize short- and long-term production from both efforts. The Bureau is cooperating with the State of Ilinois to develop basic information necessary for such planning.

0110 Reserves And Exploration

REFER ALSO TO CITATION(S) 47092

47068 **(DOE/ET/14692—2377) Peat resource estimation in Minnesota: Final report.** (Minnesota Dept. of Natural Resources, St. Paul (USA). Div. of Minerals). Jun 1987. Contract FG21-79ET14692. 24p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87006502.

The Minnesota Department of Natural Resources (DNR) completed and published reconnaissance-level investigations for four areas in Minnesota. Approximately 1,061,000 ha (2,622,000 ac) of peatland were surveyed in Aitkan, northern Beltrami Koochiching Lake of the Woods, and southwestern St. Louis counties. Within these areas, approximately 812,000 ha (2,007,000 ac) of peatland are administratively available. And, based on DOE's criteria, approximately 276,000 ha (681,900 ac) of peatland are fuel-grade resources. Calculated in terms of the higher heating value, the energy value of these deposits is 16.47 quads. Reconnaissance investigations were completed for Carlton and Itasca counties and portions of Cass, Lake, and St. Louis counties, but because of the minimal interest in fuel peat, reports were not published. These investigations examined approximately 346,600 ha (856,500 ac) of peatland, of which 191,940 ha (474,280 ac) are administratively available. The results of the investigations are recorded on file maps and stored in

the state's computer system. The DNR completed four detailed investigations at peatland sites thought to have high fuel peat potential. As a pilot project, peat sods were produced from the Fens Peatland. Peatland surveys for Boise Cascade, International Falls and the Hibbing Public Utility have produced encouraging results in conjunction with modeling that projected fuel costs. The cost of milled peat production in Minnesota can be competitive with the cost of western coal in certain production scenarios. The principles in the study have plans to continue engineering studies on conversion to fuel peat. 32 refs., 5 figs. 17 tabs.

47069 **Relationship between peat geochemistry and depositional environments, Cranberry Island, Maine.** Raymond, R. Jr.; Cameron, C.C.; Cohen, A.D. (Los Alamos National Lab., NM). *International Journal of Coal Geology;* 8: No. 1/2, 175-187(Jun 1987).

The Heath, Great Cranberry Island, Maine, offers a unique locality for studying lateral and vertical relationships between radically different peat types within 1 km². The majority of The Heath is a Sphagnum moss-dominated raised bog. Surrounding the raised bog is a swamp/marsh complex containing grass, sedge, Sphagnum moss, alder, tamarack, and skunk cabbage. Swamp/marsh-deposited peat occurs both around the margins of The Heath and under Sphagnum-dominated peat, which was deposited within the raised bog. A third peat type, dominated by herbaceous aquatics, is present underlying the swamp/marsh-dominated peat but is not present as a dominant botanical community of The Heath. The three peat types have major differences in petrographic characteristics, ash contents, and associated minerals. Sulfur contents range from a low of 0.19 wt.% (dry) within the raised bog to a high of 4.44 wt% (dry) near the west end of The Heath, where swamp/marsh peat occurring directly behind a storm beach berm has been influenced by marine waters. The presence of major geochemical variations within a 1-km² peat deposit suggests the need for in-depth characterization of potential peat resources prior to use. 11 refs.

0120 Mining

REFER ALSO TO CITATION(S) 47118, 47120

47070 **(BC—20.487) Opencast coal mining in Great Britain.** (British Coal Opencast Executive, Mansfield). 1987. 28p. British Coal Opencast Executive, Mansfield (United Kingdom).

This booklet explains all the various measures taken by the Opencast Executive before, during and after excavation has taken place. Also described is the continuing research and development programme being undertaken by the Executive as it seeks to improve its performance. The paper gives a fuller understanding of opencast coal mining, the advanced techniques it employs to minimise environmental disturbance and the important part opencast coal plays in securing the future of the coal industry.

47071 **(ECE-COAL—108) Perfecting of maintenance and servicing systems for longwall face equipment.** (United Nations, Geneva (Switzerland). Economic Commission for Europe). 3 Mar 1987. 7p. Economic Commission for Europe, Geneva (Switzerland). Coal Committee.

Technical maintenance and servicing of longwall face equipment are carried out in order to maintain the equipment in working order and to ensure productive and safe operation. The report was compiled by Soviet experts on the basis of reports on perfecting maintenance and servicing systems for longwall face equipment prepared by the Governments of Bulgaria, Czechoslovakia, the Federal Republic of Germany, Poland and the United Kingdom as well as information from the USSR. It was shown that the basic principles of perfecting maintenance and servicing systems for longwall face equipment and future development trends in the various countries are the same. The first part of the report describes the present status of the principal components of maintenance and servicing with examples from various countries and the second discusses areas of further development.

47072 **(EUR—10673-DE) Improvement of roadway stability by bolting and a composite support system.** Raetz, B.W.; Migenda, P.; Graewe, F. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1986. 174p. (In German). Commission of the European Communities.

In some cases experience shows that the results obtained with reinforced concrete segment supports remain unsatisfactory. The aim of the research described was to test different solutions in order to improve the efficiency of the traditional support type. Measurements were made of the behaviour of the gateroads' linings in order to investigate strata/support interactions.

47073 **(EUR—10865-EN) Underground use of power semi-conductor devices to control AC motors.** (British Coal, London (UK)). 1987. 108p. British Coal, London (United Kingdom).

The requirements for typical underground applications have been examined and a specification prepared for a general purpose variable speed AC motor drive which can be adapted on site to suit the particular application. Types of variable speed drive have been compared with the specification to determine the most suitable principle for the drive. Methods of achieving the selected drive design at 1100 volts and in a flameproof enclosure have been examined. Trial designs have been prepared and tested in a laboratory built for that purpose. A self-diagnostic multi-microprocessor control system has been developed and constructed and tested under software conditions. A commercial drive and small test rig has been prepared to test the control system under realistic conditions. The construction of the power semiconductor circuitry has been examined and a proposal made.

47074 **(EUR—10866-DE) Optimization of combined auxiliary ventilation systems through monitoring and regulating devices.** Muecke, G.; Marzilger, B.; Kommallein, B.; Litter, B.; Sterzing, W. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 102p. (In German). Commission of the European Communities.

Forcing auxiliary ventilation systems with flexible air ducts have generally proved effective in coalmining. They are, however, quite different to the main ventilation system. In auxiliary systems fresh air is transported in flexible ducts which are susceptible to operational defects such as damage to the ducting walls or local constrictions. These defects can reduce the flow rate in the roadhead and impair conditions in the entire auxiliary ventilated area. Monitoring of these areas is crucial to ensure no buildups of methane, as ventilation failures are prime causes of accidents in coal mines. Microprocessors have been developed that can deal with all this data and control the auxiliary ventilation systems.

47075 **(EUR—10896-FR) Rock cutting by means of picks assisted by high-pressure water jets.** Santamaria, J. (Centre d'Etudes et Recherches des Charbonnages de France (CERCHAR), Verneuil-en-Halatte). 1987. 52p. (In French). Commission of the European Communities.

The main purpose of this research into jet-assisted cutting is to extend the field of application of heading machines to harder and more abrasive rocks by using high pressure water jets to assist pick action. The work has developed along three main lines, laboratory studies of the pick/jet combination and the effect of various parameters; the selection and development of high-pressure components in particular water phasing devices; and surface and underground trials of roadheaders equipped with jet cutters. The use of axial and radial cutting heads is discussed as well as the critical cutting speeds for optimum performance.

47076 **(EUR—10897-EN) Effects of high-pressure water jets on the performance of boom-type tunnelling machines.** (British Coal, Stanhope Bretby. HQ Technical Dept.). 1987. 209p. British Coal, Stanhope Bretby (United Kingdom). Headquarters Technical Dept.; University of Newcastle-upon-Tyne (United Kingdom).

This study of the effect of high pressure water-jet assisted cutting of rock using drag type cutting tools was undertaken at the University of Newcastle and the National Coal Board's Headquarters Technical Department (HQTD). The major section of the

report is presented by Newcastle University whose objective was to investigate the effect of high-pressure water-jet assistance when cutting in a range of rock types of varying strength and abrasivity. At HQTD the emphasis was on the effect of jet assisted cutting on the wear rate and life of cutting picks. The paper describes the tests carried out and mechanisms postulated for jet assisted cutting.

47077 **(EUR—10898-FR) Drivage of staple shafts.** Boxho, J.; Phillippron, P.; Ecker, G. (Institut National des Industries Extractives, Liege (Belgium)). 1987. 83p. (In French). Commission of the European Communities.

This report reviews the drivage of shafts and in particular the mechanized methods for the construction of 110 to 140 m deep large-diameter staple shafts. Various modifications and developments have been tested including modifications to mucking grabs; the use of a drilling jumbo for drilling blasting holes; the design of a protective scaffold suitable for the mechanized operations; the design of a permanent lining of adequate strength with a suitable backfilling; and the drilling of a pilot hole to allow reaming down. Other investigations covered include raise boring, drilling deviation and the lining of boreholes while drilling.

47078 **(EUR—10899-EN) Research into fibre-optic data transmission.** (British Coal, London (UK)). 1987. 105p. British Coal, London (United Kingdom).

The object of the project was to develop an experimental underground fibre-optic data transmission link to establish the viability of fibre-optic technology for underground use. In the underground field trial data were transmitted from an instrumented coalface machine to the gate end box through fibres and to a computer at the surface for processing and display. Equipment developed for the project includes: shearer instrumentation equipment with fibre-optic transmission; a hybrid trailing cable - incorporating optical fibres; a hybrid electrical fibre-optic connector for the trailing cable; a laser transmitter and receiver, and a mine shaft and roadway cable/connector system.

47079 **(EUR—10900-FR) Shield supports simpler, lighter, more efficient.** (Institut National des Industries Extractives, Liege (Belgium)). 1987. 189p. (In French). Institut National des Industries Extractives, Liege (Belgium).

The paper describes parameters affecting the support unit weight for shield supports discovered in a research program using simplified and weight-reduced shield support designs. It was found that lightweight shields are to exhibit shortest possible length, leg arrangement normal to stratification and efficient hydraulics. Further possibilities of weight reduction are obtained by limiting the internally acting forces of the support unit. The paper considers the use of three stage telescopic legs to make adjustments, the use of shorter light weight shields with hydraulic front and rear spacers, mechanically flexible supports and hydraulic controls for supports.

47080 **(EUR—10901-DE) Mechanization of shotfiring drivage - II.** Feistkorn, E. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 94p. (In German). Commission of the European Communities.

This research project conducted between 1.4.1983 and 31.3.1986 was designed to develop and test methods and equipment to increase mechanization of shotfiring (explosive fracturing). The focal points of the research work were drilling and support technology and the work was carried out in both laboratories and underground at the Tremonia experimental mine. Areas covered included low noise drilling; dry drilling in water sensitive rocks; cutting tools and abrasion wear of the bits; roof bolting; impact hammers; shotcreting and strata control.

47081 **(EUR—10902-DE) Components of an integrated control and monitoring system.** (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 64p. (In German). Steinkohlenbergbauverein, Essen-Kray (Germany, F.R.).

Efficient data transmission systems are needed to meet the communication requirements of process control computer/peripheral links. The aim is to provide mines with a hierarchical set-up including feeder system and area/remote bus sub-areas. Requirements and possible solutions in the form of a catalogue of specifications were drawn up on this basis. The resulting draft for an adaptable mine-wide data system, with a combined star/line network, connected to a standardized computer interface and largely using existing infrastructure, led to the creation of the bus-supported data transmission system (BUGD), which can be divided into the following three sections: The underground main data ways station (DHZ) which is the link between the data/computer coupling unit on the surface (DRKL) and the data feeder lines underground. The components for this system were developed together with the appropriate software and subjected to practical tests underground. A number of modifications were then made, resulting in the final design which was then approved by the mining authorities.

47082 **(EUR—10912-DE) Face ends - minimization of layout constraints.** Schuermann, F. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 78p. (In German). Commission of the European Communities.

This research project aims at two objectives, the optimum design of face ends by means of improved decision aids and the establishment of a remote monitoring system for face workings to achieve a troublefree interrelation between face and face ends. With this in mind a series of remote control systems and monitoring networks was developed for use in underground mining to aid in decision making and improve mine management.

47083 **(EUR—10913-EN) Investigation of yield zone development around longwall coal-faces.** (British Coal, London (UK)). 1987. 163p. British Coal, London (United Kingdom).

The report presents work which forms part of a longer-term research programme intended to examine the factors influencing the stability of longwall faces. The aim is to establish knowledge of the characteristic deformation behaviour of the coal seam and proximate strata. The various yield zone hypotheses relating to excavation in coal measure strata provided a theoretical basis, and interpretation of in-situ data was performed with the yield zone theory as a basis. A geologic survey was carried out to determine frequency and orientation of natural weaknesses and the lithology of proximate roof and floor strata for the seam. Computer processing of data was carried out. A series of investigations at coal faces primarily in the South Wales Coalfield generated considerable data on coal seam behaviour and powered support performance. Selected data from each investigation are summarized and analyses are presented relating yield zone behaviour with coalface operations. The results of laboratory tests performed to investigate post failure characteristics of coal specimens are also described.

47084 **(EUR—10914-DE) External haulage drives for winning machines.** Graetz, A.; Plum, D.; Brychta, P. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 70p. (In German). Commission of the European Communities.

Within this research project the bases allowing the haulage systems for the coalwinning machine to be installed in the gateroad were set up. The resulting economy in terms of dimensions is to allow an extension of the application range of winning systems to thin seams, and to increase the capacity margin of haulage. The drives on the winning machine then are assigned by 100% to actual coalwinning. Besides the maintenance-demanding haulage drives, the complicated haulage control systems can be installed in the easier accessible face end zone. For active plough systems using either high pressure water jets, impact systems or vibrations systems, the development of externally controllable haulage drives is an absolute prerequisite. Therefore cost-effective practice of these winning technologies requires development of new controllable external haulage drives, the control behaviour of which is to be tailored to measure for the corresponding winning method.

47085 **(EUR—10915-DE) Operations diagnosis to improve plough utilization.** Rieckhof, J.; Schwolow, G. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 63p. (In German). Commission of the European Communities.

This report reviews the work done on the development of a diagnostic system to be used with coal ploughs. Such an operation would supply instantaneous data on the operating status of the plough, with as many parameters covered as possible and processed by an advanced high-speed computer. The data acquisition would be achieved by using a multitude of sensors picking up pick forces,

distance travelled by the plough and the data then stored using robust semi-conductors.

47086 **(EUR—10916-DE) Development of techniques and equipment for working through faults.** Konopka, K. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 109p. (In German). Commission of the European Communities.

The development of techniques and equipment for working through faults using plough technology concentrated on: the development of a coalwinning technique using percussion tools; the investigation of methods for working through faults with conventional coal ploughs; the investigations on coal plough picks coated with synthetic diamond materials. The percussion tools were found to produce low dust, high coal particle sizes and active horizontal control using the plows. Working through faults showed the parameters involved and the ideal type of picks required. Finally the use of synthetic diamonds proved unsuccessful with no increased efficiency due to various operating conditions.

47087 **(EUR—10917-EN) Field evaluation of automatic horizon control of ranging drum shearers.** (British Coal, London (UK)). 1987. 123p. British Coal, London (United Kingdom).

This report evaluates the application of automatic horizon control to ranging drum shearers at various collieries within the United Kingdom from 1 October 1980 to 30 September 1985. The aim of this European Coal and Steel Community-aided project was to achieve better face conditions by installing a digital automatic control system on a conventional ranging drum shearer. A subsidiary feature of the machine was the data transmission modules mounted on it, which provided performance data including engineering and health aspects for relaying to the surface for managerial use. The information gathered subsequently formed the basis for the design of the prototype version of automatically steered power loaders.

47088 **(EUR—10918-EN) Integrated system for automatic control of face alignment and advance.** (British Coal, London (UK)). 1987. 156p. Commission of the European Communities.

The research project was carried out in two parts. The first was the design of a prototype control system to supervise the advance of the AFC at discrete positions along the longwall coalface. In order to do this, monitoring of the alignment was carried out using the Coalface Surveyor infrared system and Cord Transducers. Two prototype systems were installed and tested underground and, although it was not practicable to produce further systems for exploitation, a great deal of operational experience was gained. The second part was concerned with an alternative method for alignment monitoring which measured the movement of two adjacent powered supports in relation to the AFC. The measurement method used ultrasonic techniques controlled by a microprocessor, and the individual monitoring units were situated at discrete intervals on the coalface. The Ultrasonic Advance Monitor was designed, developed and tested underground as a small prototype batch at a British Coal colliery.

47089 **(EUR—10944-EN) Computer-based monitoring and remote control of methane drainage systems.** Williams, D.J.; Budworth, D.; Kinney, J.F.; Liddle, S. (British Coal, London (UK)). 1987. 109p. Commission of the European Communities.

Over the last seven years about 65% of British mines have been equipped with standard Minos (MINe Operating System) computer-based monitoring and control systems. This report describes the work carried out on a methane drainage application to improve the management and control of methane gas extraction based on Minos. The project focussed on the following aspects of methane drainage management: (i) to optimize the performance of surface methane extraction plants; (ii) to provide advance warning of increased gas emission into the general body of air from drained areas; (iii) to improve standard monitoring and control facilities for underground gas extractors based upon Minos, eliminating the need for small, expensive stand-alone proprietary-systems; (iv) to continuously monitor and control the purity and flow of gas extraction through arterial underground pipes; (v) to reduce operating costs, improve safety, and improve the underground environment to minimize its effect on loss of coal production.

47090 **(EUR—10945-FR) Integrated manriding.** (Centre d'Etudes et Recherches des Charbonnages de France (CERCHAR), Verneuil-en-Halatte). 1987. 48p. (In French). Centre d'Etudes et Recherches des Charbonnages de France, Verneuil-en-Halatte.

The purpose of this research was to introduce manriding systems in order to reduce travelling times in coal mines. The following specific projects were undertaken at various Lorraine collieries. Reau Maux colliery developed haulage infrastructure improvements which allowed increased train speeds, at La Houve colliery the installation of a ski-lift for an inclined roadway and at the Simon colliery the design and installation of a manriding platform for inclined roadways in semi-steep seams. Whilst in the Nord/Pas-de-Calais Area various ski-lifts, belt conveyors and manriding trains have been successfully developed, tested and installed.

47091 **(EUR—10991-DE) Process control computer-assisted sub-centres, Part B.** Moellmann, H.; Koscielniak, P. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1987. 36p. (In German). Commission of the European Communities.

The field testing of the district control centre run as a pilot-project on Friedrich-Heinrich colliery of Bergbau AG Niederrhein was completed on schedule. Hardware and software equipment corresponds to these described in the final report covering part A. The successful operation is made obvious by the fact that no substantial difficulties arose even though trial operation was started without interrupting the coal face operations to be monitored. The use of this new process technology in coal faces was quite well accepted by operators and maintenance personnel because of its finish well suited to mining operations. With increasing information flow from this area which results from complex control technology and extensive statutory monitoring, the operator responsible for a district can only meet the increasing requirements of his task by use of advanced technology.

47092 **(ICTIS-RES—12) Coal research projects. Exploration, mining and preparation - 1987 supplement.** (International Energy Agency Coal Research, London (UK)). Apr 1987. 128p. IEA Coal Research, London (United Kingdom).

Details are presented of 979 research projects either in progress or completed in the last 3 years on: coal reserves and exploration; surface mining; underground mining; strata mechanics and control; mine transport and services; mine environment and safety engineering, and coal preparation. The following information is given for each project where available: organisation carrying out the research, address, telephone number, research workers, project number, collaborating organisations, sponsoring organisations, funding, and duration. For many projects there is a short summary of the work being carried out.

47093 **(IOM-TM—87-05) Proceedings of the seminar on the ergonomics of locomotives and free-steered vehicles.** Mason, S. (ed.). (Institute of Occupational Medicine, Edinburgh (UK)). Mar 1986. 49p. (CONF-8608196—). Institute of Occupational Medicine.

From Seminar on the ergonomics of locomotives and free-steered vehicles; Bretby, UK (20 Aug 1986).

The paper contains the proceedings of a seminar called to present the design guidelines prepared on the ergonomic aspects of locomotive and free-steered vehicle design and which can be used without reductions in individual design flexibility. Topics covered are: ergonomic limitations of existing locomotives and free-steered vehicles, including workplace design, maintainability and designing out ergonomic problems; inproving the design of the driver's cab workspace design and headlights; ergonomics in the maintenance of locomotives and free- steered vehicles, including access to components; lifting and handling and manual force application; noise and vibration and hearing protector effects on communication; and the operational disadvantages of ignoring ergonomics. 4 refs.

47094 **(NP—7770323) Planning aids for trackless vehicles for underground applications in black coal mining.** Doerr, E.P. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen). 14 Nov 1985. 109p. (In German). NTIS (US Sales Only), PC A06. File Number DE87770323.

Trackless vehicles are analyzed with a view to their steering systems, running resistance, curve driving characteristics, drives, and brakes. General equations and nomograms are presented to facilitate the construction and application of the vehicles and to give decision aids for the construction of underground roadways.

47095 **(PB—87-204517/XAB) Clay veins: their occurrence, characteristics, and support. Report of Investigations/1987.** Chase, F.E.; Ulery, J.P. (Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center). 1987. 26p. (BM-RI—9060). NTIS, PC A03/MF A01.

Library of Congress catalog card no. 86-600245.

Clay veins found in coal mines have caused numerous injuries and fatalities. These structures plague all phases of mining, including entry development, pillar recovery, and panel extraction. Clay veins also increase production costs and may disrupt or halt mining. The occurrence and origins of clay veins were investigated to determine predictive capabilities. The investigators found that clay veins normally occur in more-stable, less-rapidly-subsiding coal basins. Clay veins result when tensile stresses develop fissures that are later infilled. These fissures can be propagated by compactional processes and/or tectonic stresses during and subsequent to coalification. It was found that associated faults, fractures, and slickenside planes accompany parallel clay veins and disrupt the lateral continuity of the immediate and, sometimes, main roof.

47096 **(PB—87-208401/XAB) Guidelines for dust control in small underground coal mines. Handbook.** Divers, E.; Jayaraman, N.; Page, S.; Jankowski, R. (Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center). 1987. 39p. (BM/HB—1-87). NTIS, PC A03/MF A01.

Library of Congress catalog card no. 86-600359.

The Bureau of Mines handbook presents guidelines for controlling dust in underground room-and-pillar coal mines. The dust-control techniques presented are primarily directed toward cost-effectiveness for the operators of small mines facing tightened Federal regulations due to excessive respirable quartz dust. Emphasis is placed on the latest developments in ventilation and water sprays for continuous-mining, auger, and conventional-mining sections.

47097 **(PB—87-214755/XAB) Analysis of rock chips produced during water-jet-assisted cutting. Report of Investigations/1987.** Styler, A.N.; Thimons, E.D. (Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center). 1987. 21p. (BM-RI—9073). NTIS, PC A02/MF A01.

Library of Congress catalog card no. 86-607913.

The objective of thiss research is to increase coal-extraction efficiency by seeking an improved understanding of the synergistic relationship between mechanical cutters and water jets, enabling the design of more-effective cutterheads. Rock chips collected during laboratory traverse speed jet-assisted cutting tests were analyzed with respect to the size distribution of the chips and the forces measured during cutting. As the water-jet pressure was increased, the size distribution of the product became coarser with V-face-type cutting tools producing less fine material than conical cutting tools. Fracture mechanics theory accounted for less than 10 pct of the energy consumed during fragmentation of the rock. The energy consumed by processes other than rock breakage decreased with the use of water jets and increasing advance rate.

0130 Transport And Handling

REFER ALSO TO CITATION(S) 47056, 47093, 47305

47098 **(PB—87-207056/XAB) Distributing the risks of interbasin water transfers under drought conditions: the dilemma posed by coal-slurry pipelines. A summary version.** (Teknekron Research, Inc., Berkeley, CA (USA)). Feb 1983. 28p. NTIS, PC A03/MF A01.

See also report dated Mar 82, PB—82-256595.

This summary document should be of interest to any researchers and policy makers in the water resource community who have a background in, or are concerned with, problems associated with the use of western water for energy-related projects. There is emphasis in the summary version on the study design, the methodology, the legal findings, and on additional research needs. The document suggest how decision makers can begin to implement the study's recommendations.

0140 Combustion

REFER ALSO TO CITATION(S) 47029, 47066, 47353, 48089, 48154, 48156

47099 **(DOE/MC/21071—2358) Coal-water slurry (CWS) dispenser: Final report.** Loth, J.L.; Kulkarni, B.M. (West Virginia Univ., Morgantown (USA). Dept. of Mechanical and Aerospace Engineering). [1987]. Contract AC21-84MC21071. 74p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87009073.

This thesis addressed some of the problems associated with using Coal-Water Slurry as a fuel in gas turbine combustors. A technique has been developed which reduces the velocity and average droplet size distribution needed for good atomization to achieve high combustion efficiency. Finely atomized droplets are desired to minimize the number of coal particles which fuse together in the high radiation zone. Any big droplet discharged from the atomizing nozzle will be slow to dry and ignite, which consequently may reduce the combustion efficiency. To study the characteristics of a CWS spray entering the combustor, a dryer dispenser unit was designed and built. Typical gas turbine operating conditions are discussed. Atomization aspects are discussed. CWS nozzles are found to produce high velocity spray with a wide range of particle sizes. Dried samples were studied under the scanning electron microscope. The micrographs of the samples collected in the range of 70 to 550°F show that the individual coal particles are within a 15 micron range. The single droplet drying rate was found to be unrelated to that occurring inside a jet. Particles collected at room temperature are sharp and not rounded at the edges. Particles collected at 400°F have a tendency to stay together; they are much more rounded at the edges than those collected at 70°F. The individual particle size distribution is not much affected in the range of temperatures from 70 to 500°F, but agglomeration is directly proportional to the dryer temperature. Since the particle size distribution of CWS does not change much in the range of 70 to 500°F, predrying prior to entering the high radiation zone, is not beneficial. Fine CWS atomization is more important to decrease the ignition delay and to maximize the combustion efficiency.

47100 **(DOE/PC/80517—T8) Improving the stability of coal slurries: Quarterly progress report for the period June 15, 1987-September 15, 1987.** Fogler, H.S. (Michigan Univ., Ann Arbor (USA). Dept. of Chemical Engineering). 1987. Contract FG22-85PC80517. 15p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000071.

Gum tragacanth, GT is a polysaccharide containing tragacanthic acid and arabinogalactan. In order to find which polysaccharide is responsible for the stabilization, the arabinogalactan and polygalacturonic acid were used in the flocculation test. The polygalacturonic acid is a linear polysaccharide which constitutes the core of tragacanthic acid that is branched polysaccharide. The much greater stabilization effect by polygalacturonic acid indicated that the tragacanthic acid is responsible for the stabilization by GT. More interestingly, the similar pH dependence of the stability was found for polygalacturonic acid as had been found for GT. The binding study indicated that this pH effect for polygalacturonic acid is due to the difference in the amount of adsorption whereas the pH effect for GT is due to the difference in the steric layer thickness with about the same amount of adsorption. This relative pH independence of amount of adsorption for GT indicates that the binding mechanism of GT is hydrophobic. In order to verify this, the hydrophilic latex was used in the adsorption study as well as hydrophobic latex. It was found that the amount of adsorption of GT for the hydrophilic latex was less than that for the hydrophobic sulfate polystyrene latex. 10 refs., 6 figs., 2 tabs.

47101 (ECE-COAL—109) Problems connected with the utilization of low-grade lignite. (United Nations, Geneva (Switzerland). Economic Commission for Europe). 2 Mar 1987. 18p. Economic Commission for Europe, Geneva (Switzerland). Coal Committee.

The object of the report is to help in solving combustion problems which arise when lignite (brown coal) is used as a power station fuel. Information was collected on solutions found for problems connected with opencast mining of lignite and its utilization as a fuel at thermal power stations in the following countries: France; Greece; Federal Republic of Germany; Czechoslovakia; Bulgaria; USSR; Poland; German Democratic Republic; and Hungary. Environmental protection is also considered in these countries.

47102 (EUR—10133-EN) Flames of coal water slurry. Engelberts, E.D. (Koninklijke Nederlandse Hoogovens en Staalfabrieken, Ijmuiden). 1986. 159p. Commission of the European Communities.

Coal water mixtures are potentially attractive as slurry fuel and may successfully replace oil or gas. Some processes in an integrated steelplant are particularly suited for the application of coal water mixtures because the fly ash of the coal can be entrapped in the product, for example: the ignition of a sinterbed, the drying in the grinding section of a pellet-plant or a cement-plant. This ECSC-project is directed to research in the field of coal water mixtures. The specific aim was to design burners suitable for an ignition hood of a sinter strand. In addition to the tests with coal water mixtures a test run was done with dry pulverized coal for reasons of comparison.

47103 (EUR—10518-DE) Direct reduction by the rotary-kiln method. Gudenau, H.W.; Hennig, M.; Formanek, L.; Eichberger, H. (Verein Deutscher Eisenhuettenleute (VDEh), Duesseldorf (Germany, F.R.)). 1987. 411p. (In German). Commission of the European Communities.

The research project described in the paper dealt with the following two options: adjustment of the carbon content in sponge iron and the effect on smelting properties; and utilization of the waste-gas heat and the excess coal to reduce energy consumption and to increase the economic efficiency of the rotary-kiln process. The first part of the project, on carburization, was conducted at the Institute of Ferrous Metallurgy of Aachen Technical University and the second part was carried out by Lurgi GmbH, Frankfurt/Main. The paper describes the results achieved.

47104 (EUR—10577-EN) Blast furnace coal injection at minimum cost. Gathergood, D.S.; Jukes, M.H.; Lochrie, L.; Smith, J.V.; Hanniker, G.; Maldonado, R.; Jenkins, D.P. (British Steel Corp., London). 1986. 163p. Commission of the European Communities.

Granular coal injection has now been practised on Scunthorpe blast furnaces for almost three years with injection on the two larger furnaces now standard operating practice. This paper details the developments in plant and equipment together with the effect of coal properties, the analysis of blast furnace performance and a financial evaluation. An integral part of the research program was the pilot plant combustion studies at the Welsh Laboratories of BSC. The results of the effect of coal properties and simulated blast conditions upon coal combustion in this pilot plant are reported in detail.

47105 (KTM/E-B—62) Competitiveness of domestic fuels in the year 1986. Kalmari, A.; Leino, P. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). Dec 1986. 111p. (In Finnish). NTIS (US Sales Only), PC A06. File Number DE87753324.

Domestic fuels in this report comprise sod peat, milled peat, wood chips, wood waste, pellets. They were compared with light fuel oil, heavy fuel oil, hard coal, natural gas and in respect of condensing power with nuclear power, too. The technical calculation bases, calculated need of capital and the energy production costs were determined for all the alternatives - and further divided into power and heat production costs in respect of the power plants. The effects of the energy taxation reform were also taken into account. The purpose of the calculations was to compare the competitiveness of domestic fuels in various power plant size classes with comparison fuels at the price level of the period under review. Generally it can be stated that domestic fuels were not competitive with oil or natural gas in August. The price of heavy fuel oil should rise up to FIM 60-70/MWh from FIM 47/MWh to make milled peat competitive in new industrial back-pressure power plants or power and heat supply stations. In district heating power stations milled peat or sod peat will become competitive if the oil price rises up to FIM 80-90/MWh. With regard to coal, milled peat is equally economical in rather big heat and power supply stations and industrial power plants in the inland parts of Finland. The costs of coal plants include desulphurization costs. In smaller power plants and district heating stations, the competitiveness of peat would require a 10-20% increase in coal prices without any rise in peat prices. In production of condensing power, milled peat is an economical fuel if the peat-fired power plant is compared with the similar-sized coal fired plant. When comparing a 150 MW peat fired power plant with a 500MW coal fired power plant or a 1000MW nuclear power plant, power generated by peat is equally expensive or more expensive with the assumptions made in this report.

47106 (MINTEK-M—288) Direct reduction of hematite fines with coal in a fluidized bed. Berg, J.C. van den; Dippenaar, R.J. (Council for Mineral Technology, Randburg (South Africa)). 17 Dec 1986. 22p. Council for Mineral Technology.

A preliminary investigation was undertaken on the direct reduction of hematite fines in a single-stage fixed fluidized bed. Coal was combusted in situ as a means of supplying the heat and producing the reducing gas. It was found that the type of coal used had significant effect on the behaviour of the fluidized bed. With the reactor used and a selected type of coal, a reduction of 11.1 per cent was obtained. Various fundamental principles underlying the process were investigated. On this basis, ways of improving the reduction are suggested. 16 refs.

47107 (PPP-Julk—3) Pressurized fluidized bed combustion. A literature study. Hulkkonen, S.; Jahkola, A. (Suomen Akatemja, Helsinki (Finland)). Jun 1985. 196p. (In Finnish). NTIS (US Sales Only), PC A09/MF A01. File Number DE87753067.

The purpose of this study was to examine pressurized fluidized bed combustion (PFBC) and its applications. In the beginning of the report foreign experimental facilities and conceptual plant-scale designs are presented. In addition, economics of different concepts have been compared. Finally special features of PFBC are examined. Research in PFBC is mainly centered on applications of burning coal. The first laboratory scale experiments were carried out in 1969 at Leatherhead, UK. At the moment there are 13 experimental units, of which three are pilot-plants. Commercial phase is supposed to be reached in the early 1990's. The most obvious application of PFBC is in a combined cycle (CC) system. The power generating efficiency of a combined cycle is potentially five units of percentage higher than that of conventional pulverized fired plant with wet scrubbers to remove SO/sub 2/. The presented conceptual designs are mainly big coal burning PFBC combined cycle plants. In Sweden, however, they are developing a district heating power plant in which flue gases of the wet fuel are condensed under high pressure. The condensing heat is used for district heating. The most important advantages of PFBC are high combustion efficiency, environmental performance and the small size of the equipment. SO/sub 2/ can be captured during the combustion process and NO/sub x/ emissions are low. The most difficult problems are fuel feeding against pressure, particulate removing before gas turbine and erosion/corrosion of gas turbine materials.

47108 (SVF—216) Characterization of eleven coals and their combustion behaviour. Bengtsson, M. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden); Studsvik Energiteknik AB, Nykoeping (Sweden)). Feb 1986. 137p. (In Swedish). (STUDSVIK-EB—85-52). NTIS (US Sales Only), PC A07. File Number DE87753091.

This study covers coals in a wide range of inertinite content of 14-65 percent, originating from different parts of the world. A comprehensive characterization of chemical and physical properties

has been performed. The petrography is described and the structural changes on burnout are exemplified. The reactivity of the coals has been studied by thermogravimetry and activation energies have been evaluated. The profiles of burnout and heat release are commented on. Comparative evaluations between test results and the properties of coal specimens have been made. (G.B.).

47109 **(SVF—218) Characterization of twenty coals and their combustion behaviour.** Bengtsson, M. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden); Studsvik Energiteknik AB, Nykoeping (Sweden)). Feb 1986. 179p. (In Swedish). (STUDSVIK-EB—85-31). NTIS (US Sales Only), PC A09/MF A01. File Number DE87753092.

This study complements the earlier studied coals within the same project. The coal property range represents a broad interval of volatility and reflectance, high content of ashes and inertinite. In addition, the following components have been present in some of the coals: pseudovitrinite, tectonic and weathered coals. The reactivity of the coals has been studied by thermogravimetry and in a drop tube furnace. The differences in burnout mechanisms have been reported for different maceral groups. (G.B.).

47110 **(SVF—224) Reduction of nitrogen oxides in combustion of peat.** Blomqvist, G.; Eklund, G. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden)). Jul 1986. 93p. (In Swedish). NTIS (US Sales Only), PC A05/MF A01. File Number DE87753111.

The work is divided into two parts: an experimental study of nitrogen compounds during flash pyrolysis of peat. A literature study of the content and chemical bonding of nitrogen in peat, and also of peat combustion experience. The following conclusions can be drawn from the work carried out: Peat samples from different bogs show a marked similarity in important combustion parameters. The data indicate that peat might be regarded as a uniform fuel from a chemical and thermodynamic stand-point. Differences observed when burning peat at different installations are mainly due to plant-specific conditions as well as peat properties like water content, physical structure of sod peat, and inorganic constituents of peat. Properties of peat char must be investigated. Nitrogen content is of particular interest. Theoretically staged combustion of peat should reduce NOsub(x) emissions. This has to be verified. The combustion process for large peat sods must be studied further. Information regarding NOsub(x) reduction when burning peat and biomass is very scarce. At least 30-50 percent of the nitrogen content of peat is bound as amino acids either in the form of high-molecular proteins or bound to liquids or equivalent. The chemical form of the non-amino acid nitrogen is known. Probably much of it is bound in condensed heterocyclicaromatic ring structures. Increased humification may increase the importance of ring structures. The knowledge of nitrogen contents of Swedish peat is satisfactory. (authors). With 58 refs.

47111 **(TKK-KO/E—22) Development of pressurized fluidized bed combustion. Final report.** Jahkola, A.; Hulkkonen, S.; Horvath, A.; Boij, J.; Kurkela, E.; Mojtahedi, W.; Saviharju, K. (Helsinki Univ. of Technology, Otaniemi (Finland). Inst. of Energy Engineering). 1987. 210p. (In Finnish). NTIS (US Sales Only), PC A10/MF A01. File Number DE87753346.

The research of pressurized fluidized bed combustion (PFBC) at the Helsinki University of Technology (HUT) in the Laboratory of Energy Economics and Power Plant Engineering was started in 1985. The research has mostly been financed by the Ministry of Trade and Industry and the Academy of Finland. In 1985 the research included literature studies, computer modelling and pre-design of the PFBC-experimental unit. Later also Technical Research Centre of Finland (Laboratory of Fuel Processing and Lubrication Technology) (VVT/POV) and Imatra Power Company (IVO) joined in the project. The building of the test rig was started in autumn of 1986. The test rig is funded by HUT, VTT and IVO. This final report concentrates on the research done in 1986 and its results. The project "Development of Pressurized Fluidized Bed Combustion" was financed by the Ministry of Trade and Industry and the Academy of Finland. This report includes a short review of different subjects of the research. The main topic of the project was to design and build a 100 kW PFBC test rig operating at pressures up to 10 bar. The rig was commissioned in spring of 1987. The main fuel to be used is peat. In addition, the project included techno-economical evaluations of PFB-power plant processes and surveying the market potential of PFB-plants. Also literature reviews were carried out concerning gas cleaning at high temperatures and pressures.

47112 **(TVA/PUB—88/1) Atmospheric fluidized-bed combustion waste utilization in cement and sulfuric acid: Preliminary feasibility study.** Salladay, D.G.; Nichols, D.E.; Berry, J.T.; Call, D.B.; Harre, E.A.; Kim, Y.K. (Tennessee Valley Authority, Muscle Shoals, AL (USA). Office of Agricultural and Chemical Development). Mar 1986. 143p. NTIS, PC A07/MF A01. File Number DE88900008.

An OACD interdisciplinary project team has investigated the preliminary feasibility of using atmospheric fluidized-bed combustion (AFBC) waste in the production of portland cement and sulfuric acid. This investigation found that it is technically and economically feasible to simultaneously produce electricity, portland cement, and sulfuric acid in an environmentally clean, integrated industrial complex. This complex would include a 500-MW AFBC unit costing an estimated $450 million, a portland cement plant costing $125 million, and a sulfuric acid plant costing $53 million. This complex would produce 990,000 tons per year of portland cement and 532,000 tons per year of sulfuric acid. This complex would be fed 1.17 million tons per year of limestone and 106,000 tons per year of auxiliary elemental sulfur. The demonstration units for sulfuric acid and portland cement production that could be combined with the 160-MW AFBC unit in Paducah, Kentucky would cost $40 million. Marketing studies indicate that the portland cement and sulfuric acid produced can readily be sold into established markets. This project team recommends that laboratory, pilot plant, and economic-engineering studies continue to prepare for the demonstration of this environmentally clean, integrated industrial complex to produce electricity, portland cement, and sulfuric acid. 165 refs., 13 figs., 21 tabs.

47113 **Combustion of coal-water slurries.** Dunn-Rankin, D.; Hoornstra, J.; Gruelich, F.A.; Holve, D.J. (Sandia National Labs., Livermore, CA). *Fuel;* **66**: No. 8, 1139-1145(Aug 1987).

The effect of coal rank on pulverized coal and coal-water slurry combustion was examined in a laboratory laminar flow reactor. Two coals were used: a low-rank lignite with high mineral matter content and a high-rank bituminous coal with low mineral matter content. The evolution of the particle size distribution of these two coals in both dry and slurry form during combustion was measured with an in situ optical particle counter. Samples were also collected after different combustion durations and were examined with a scanning electron microscope. The results indicate that the coal slurry atomization process affects the particle size distribution, but inherent coal properties associated with coal rank do not significantly affect the initial and early combustion behaviour of the pulverized coal or coal-water slurry. During char oxidation, the ash constituent of the coal dominates the small particle size distribution, while the behaviour of the large particle size distribution and agglomerates depends on the coal rank. 18 refs., 6 figs., 1 tab.

47114 **Erosion calculations in a two-dimensional fluidized bed.** Lyczkowski, R.W.; Bouillard, J.X.; Berry, G.F.; Gidaspow, D. (Energy and Environmental Systems Div., Argonne National Lab., Argonne, IL). pp 697-706 of Proceedings of the 1987 international conference on fluidized bed combustion: FBC comes of age. Mustonen, J.P. New York, NY; American Society of Mechanical Engineers (1987). (CONF-870540—).

From 9. international conference on fluidized bed combustion; Boston, MA, USA (3 May 1987).

Erosion in fluidized-bed combustors, a nearly commercial means of burning coal cleanly, has surfaced as a serious issue that may negatively affect their economics. The evidence suggests that the key to understanding this erosion is detailed knowledge of the coupled and complex phenomena of solids circulation and bubble motion. The FLUFIX computer code has been developed for this purpose. Computed hydrodynamic results compare well with limited experimental data (including the bubble frequency and size and

the time-averaged porosity distribution) taken in a thin two-dimensional rectangular fluidized bed containing a rectangular obstacle. The monolayer energy dissipation erosion model is developed and shown to generalize the power dissipation erosion model used successfully to analyze slurry jet pump erosion. The computed transient and time-averaged transient energy dissipation rates for the monolayer energy dissipation and Finnie erosion models are compared.

0150 Marketing And Economics

REFER ALSO TO CITATION(S) 47070

47115 **(ICEAS-C—7) Cost and availability of Canadian coal.** Jamieson, E.D. (International Energy Agency Coal Research, London (UK)). Nov 1986. 105p. IEA Coal Research.

This report is one of a series by IEA Coal Research on the projected cost and future availability of thermal coal supplies from major coal-exporting countries. The primary objective is to provide cost and supply projections for Canadian thermal coals in domestic and international markets up to the year 2005. In Canada, however, the projection and marketing of thermal and metallurgical coals are integrated activities. A parallel assessment of cost and supply prospects for Canadian metallurgical coal is therefore provided. The current picture of coal supply and demand in Canada is evaluated through a review of changes that have occurred and trends that have been identified in coal supply, consumption and trade during the last 25 years. Building on the demand patterns and trends, an assessment is made of the future demand for Canadian thermal and metallurgical coals in domestic and international markets. This is followed by a corresponding assessment of Canadian thermal and metallurgical coal supply potential. The various demand and supply projections are drawn together to provide a comparative evaluation of future market price estimates and required delivery cost estimates. Reconciled Canadian coal demand and supply projections are produced for domestic markets and exports. Supply projections are produced for the period 1985-2005, illustrating the projected Canadian thermal and metallurgical coal supplies that would be available for export at various price levels. 91 refs., 18 figs., 86 tabs.

47116 **(PB—87-203923/XAB) Coal Distribution Data, 1980-1986 (EIA Form 6). Data file.** Gerard, A.; Becker, H. (National Energy Information Center, Washington, DC (USA)). 1986. 1p. NTIS CP T02.

Source tape is in the EBCDIC character set. This restricts preparation to 9 track, one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products if you have questions.

Includes information on the distribution (shipments in tons) of U.S. coal by coal-producing district of origin, consumer end-use category state of destination and method of transportation. Destinations are domestic (by State) or foreign (the total amount of coal shipped for export). Data are reported quarterly. Data are collected from U.S. companies that owned or purchased and distributed in excess of 50,000 tons of coal during a year. These companies include coal-mining companies, wholesale coal dealers, and retail coal dealers.

0160 Health And Safety

REFER ALSO TO CITATION(S) 47044, 47050, 47055, 47056, 47095

47117 **(NP—7770325) Influence of underground smoking and dust on the symptomatology of chronic bronchitis and pulmonary emphysema in underground coal miners of an Aachen coal mine.** Kahabka, M. (Technische Hochschule Aachen (Germany, F.R.). Medizinische Fakultaet). 22 May 1984. 118p. (In German). NTIS (US Sales Only), PC A06. File Number DE87770325.

From April 1978 till June 1980, 767 underground-working coal miners from a coal mine north of Aachen were questioned in the framework of a factory doctor's check-up using the questionnaire from the European Community, Coal and Steel Division, entitled 'Chronic bronchitis and pulmonary emphysema' (1967 edition). From the results of the evaluation of the anamnestic, clinical, and radiological data and from the analysis of lung function, the two factors, smoking and dust, were weighted as follows: With the routinely-used examination methods available to factory doctors, it was determined that, above all, smoking had a influence on the frequency of bronchopulmonary symptoms. The duration of exposure to dust underground was less of a factor by itself, but was more important as a co-factor with smoking. In all of this the role of age should not be disregarded.

47118 **(NP—7900972) Annual report of the Secretary of Labor under the Federal Mine Safety and Health Act of 1977, Fiscal Year 1985.** (Mine Safety and Health Administration, Denver, CO (USA)). 1985. 167p. NTIS, PC A08/MF A01. File Number DE87900972.

Mining, an industry vital to our Nation's economy, continues to become a safer and more healthful occupation in which to work. In the 1980's, cooperative efforts by the mining community have resulted in unprecedented safety progress. Fatal mine accidents, once totaling over 3000 a year, have declined to less than 200 annually. Nonfatal accidents also have been at their lowest levels in history. How has this progress come about? There are many sides to the story. One is technology: safety devices, monitoring equipment, highly productive mining machines that expose fewer workers to mine hazards. Another is training: today's miners have more education in safe and healthful work practices than ever before. A third is teamwork: strong safety programs, labor-management cooperation, and good working relationships among members of the mining community. In FY 1985, the Mine Safety and Health Administration worked to support all these aspects of safety progress. Besides inspecting the Nation's mines, we carried out many special programs to improve safety and health. In the coal industry, for example, management, labor, and other government agencies joined with us in a concerted attack on the most frequent cause of coal mine deaths - falls of the coal mine roof. In FY 1985, these fatalities declined sharply. Increasingly, mining people recognize that safety and high productivity are compatible goals. For example, the coal industry recently achieved new safety records while producing more coal than ever before in history. A safe and healthful working environment and productivity go hand in hand. As one industry leader put it, "Safety is good business." The industry can't afford not to be safe or to maintain unhealthful working conditions.

47119 **(NP—7900973) Comparison of hearing protector rating methods and recommendations for use in the mining industry.** Maraccini, L.C. (Mine Safety and Health Administration, Denver, CO (USA)). 1987. 30p. (IR—1176). NTIS, PC A03/MF A01. File Number DE87900973.

During the last ten years, numerous concerns have developed over rating methods to approximate the amount of noise reduction obtained by using hearing protection in various situations. This publications discussed four different rating methods in regard to their use in mining environments. These are the present methods used by the Mine Safety and Health Administration (MSHA), the Environmental Protection Agency method, the National Institute for Occupational Safety and Health method, and finally, a modified method developed by MSHA from the National Institute for Occupational Safety and Health method. The present MSHA method is easy to use and agrees with current MSHA regulations with regard to measurement instrumentation and measurement techniques. However, it has been found that the rating values do not give a realistic estimation of the protection provided. The values obtained highly overestimate the protection. The NIOSH method is probably the most accurate method available with regard to estimating the protection provided. The modified MSHA method gives a very good estimation of protection in the mining industry. The comparative analysis between the modified MSHA rating values and the EPA rating values definitely suggests that a combination of the two would be the best solution. The utilization of the NRR with the 7dB correction factor would give very good estimates of the protection provided in the mining environment. It will be simple to use from the inspector's standpoint and it would conform to current MSHA regulations regarding measurement instrumentation procedures. 2 figs., 2 tabs.

47120 **(NP—7900974) Injury experience in coal mining, 1985.** (Mine Safety and Health Administration, Denver, CO (USA). Safety and Health Technology Center). 1987. 383p. (IR—1184). NTIS, PC A17. File Number DE87900974.

This Mine Safety and Health Administration (MSHA) informational report reviews in details the occupational injury and illness experience of coal mining in the United States for 1985. Data reported by operators of mining establishments concerning work injuries are summarized by work location, accident classification, part of body injured, nature of injury, occupation, and anthracite or bituminous coal. Related information on employment, worktime, and operating activity also is presented. Data reported by independent contractors performing certain work at mining locations are depicted separately in this report. For ease of comparison between coal mining and the metal and nonmetal mineral mining industries, summary reference tabulations are included at the end of both the operator and the contractor sections of this report. Data used in compiling this report were reported by operators of coal mines and preparation plants on a mandatory basis as required under the Federal Mine Safety and Health Act of 1977, Public Law 91-173 as amended by Public Law 95-164. Since January 1, 1978, operators of mines or preparation plants or both which are subject to the act have been required under 30 CFR, Part 50 to submit reports of injuries, occupational illnesses, and related data. 3 figs., 46 tabs.

02 PETROLEUM

0201 Reserves

47121 **(DOE/FC/10503—2399) An inventory of the peat resources of the State of Wisconsin: Final report.** Panosh, R.L.; Madison, F.W.; Bullington, S.W. (Wisconsin Geological Survey, Madison (USA)). Jun 1987. Contract FG18-81FC10503. 48p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87006514.

The goals of this project were to inventory and assess the quality of Wisconsin peat deposits for fuel and other uses, and to estimate the quantity of commercial fuel-grade peat in the state. For the inventory, Wisconsin was divided into provinces/subprovinces based on physiographic and geomorphic characteristics. Within these areas, representative deposits were selected for sampling. Bogs were transected, depth measurements taken, and samples taken where the histic materials were thought to be deepest. 1120 samples from 220 pedons were collected and analyzed for moisture and ash content, bulk density and pH (in H_2O and $CaCl_2$). Proximate, ultimate, and Btu analyses were done on 200 subsamples of representative pedons. Data from previous research on 550 samples, representing an additional 130 pedons, were added to the data set. Hectarages of peat deposits greater than 127 cm (50 in.) were determined for each province/subprovince and estimates of fuel-grade peat were developed.

0202 Geology And Exploration

REFER ALSO TO CITATION(S) 47133, 47162

47122 (EPRI-AP—5301, pp 2.31-2.80) **Introduction of well log analysis.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

Today's logs are extremely sophisticated. Electrical well logging has become the major source of information for the evaluation of oil and gas wells. What was originally little more than a correlation tool for the geologist has become an indispensable data source for the log analyst, the engineer, the geophysicist and the drilling contractor. The ultimate objectives of well logging are to locate and evaluate hydrocarbon reservoirs. The modern logging program not only supplies data for sub-surface structural mapping but also provides information regarding: lithology, identification of productive zones, depth and thickness of productive zones, and effective quantitative and qualitative interpretation of reservoir characteristics and content. Thus, the modern logging program forms the nucleus for effective decision making. Although the science of wireline logging has literally entered the computer-age, the intent of this study was to establish a basic foundation for log analysis. An understanding of the basic concepts is essential to even the most sophisticated interpretation techniques.

47123 (EPRI-AP—5301, pp 7.24-7.26) **New developments in remote elemental analysis of rock formations.** Scott, H.D. (Schlumberger Well Services). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

In oil well logging, measurements are made of the physical properties of the rock formations surrounding the borehole to determine the mineral fractions and fluids present. Basic measurements make use of electromagnetic, sonic, and nuclear technologies in about equal proportions. Traditional methods use resistivity, density, neutron, and sonic logs. The use of nuclear techniques to provide elemental analysis of borehole formations is described. This procedure makes use of gamma ray spectrometry for use in open and cased bore holes.

47124 **(NIPER—214) Geological characterization and statistical comparison of outcrop and subsurface facies: Shannon shelf sand ridges: Topical report.** Jackson, S.; Szpakiewicz, M.; Tomutsa, L. (National Inst. for Petroleum and Energy Research, Bartlesville, OK (USA)). Sep 1987. Contract FC22-83FE60149. 64p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87001243.

The primary objective of this research is to develop a methodology for constructing accurate quantitative models of reservoir heterogeneities. The resulting models are expected to improve predictions of flow patterns, spatial distribution of residual oil after secondary and tertiary recovery operations, and ultimate oil recovery. The purpose of this study is to provide preliminary evaluation of the usefulness of outcrop information in characterizing analogous reservoirs and to develop research techniques necessary for model development. The Shannon Sandstone, a shelf sand ridge deposit in the Powder River Basin, Wyoming, was studied. Sedimentologic and petrophysical features of an outcrop exposure of the High-Energy Ridge-Margin facies (HERM) within the Shannon were compared with those from a Shannon sandstone reservoir in Teapot Dome field. Comparisons of outcrop and subsurface permeability and porosity histograms, cumulative distribution functions, correlation lengths and natural logarithm of permeability versus porosity plots indicate a strong similarity between Shannon outcrop and Teapot Dome HERM facies petrophysical properties. Permeability classes found in outcrop samples can be related to crossbedded zones and shaley, rippled, and bioturbated zones. Similar permeability classes related to similar sedimentologic features were found in Teapot Dome field. The similarities of outcrop and Teapot Dome petrophysical properties, which are from the same geologic facies but from different depositional episodes, suggest that rocks deposited under similar depositional processes within a given deposystem have similar reservoir properties. The results of the study indicate that the use of quantitative outcrop information in characterizing reservoirs may provide a significant improvement in reservoir characterization. 17 refs., 5 tabs.

47125 **(NP—7770322) Assessment of Bentheim sandstone shalification in the Ruehlermoor oil field using borehole logs and drill cores.** Grote-Sedlacek, R. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 18 May 1984. 182p. (In German). NTIS (US Sales Only), PC A09. File Number DE87770322.

The mineralogical composition of the clay fractions of four cores and two shot core series of the Bentheim sandstone, Ruehlermoor oil field, was investigated in laboratory studies. As the clay in this oil field has qualitatively and quantitatively constant conditions, there is a mathematically definable proportionality between the percentage by weight of clay in the rock strata and the logs of the gamma probe. This proportionality was determined empirically

from the clay concentration of three cores and from a comparison of gamma logs according to depth.

47126 **(PB—87-198925/XAB) Coastal oceanography of the northeastern Gulf of Alaska. Final report.** Muench, R.D.; Temple, P.R.; Gunn, J.T.; Hachmeister, L.E. (National Ocean Service, Anchorage, AK (USA). Ocean Assessments Div.). Jan 1982. 143p. NTIS, PC A99/MF E04.

The primary objective of the Alaska Outer Continental Shelf Environmental Studies Program is to develop an information base permitting prediction of the spatial and temporal distribution of petroleum-related contaminants following their hypothetical release in coastal waters. The Bureau of Land Management (BLM) program requires background information for management from possible damage during oil and gas exploration and development.

47127 **(PB—87-207197/XAB) Monitoring oil-exploration activities in the Beaufort Sea. Social and economic studies program technical report Number 107. Final report.** Waring, K.; Lundell, G. (Waring (Kevin) Associates, Anchorage, AK (USA)). Jan 1985. 263p. NTIS, PC A12/MF A01.

The purpose of this study is to obtain an accurate historical accounting of events, equipment, timing, employment, wages, locations, requirements, expenditures and effects of outer continental shelves (OCS) activity through October 1983. Up to November 1983, seventeen exploration wells were completed or committed, eleven on artifical gravel islands and six on natural barrier islands. Total onsite employment for Beaufort Sea exploration programs for 1980-83 period was estimated at 1532 manyears of which 1,185 manyears or 77% was provided by Alaskan residents.

47128 **Significance of drilling and coring-induced fractures in Mesaverde core, northwestern Colorado.** Finley, S.J.; Lorenz, J.C. (Sandia National Labs., Albuquerque, NM). *AAPG Bulletin;* **71**: No. 5, 556(May 1987). (CONF-870606—).

From American Association of Petroleum Geologists annual meeting; Los Angeles, CA, USA (7 Jun 1987).

Several types of mechanically induced fractures occur in Mesaverde core from the US Department of Energy's Multiwell Experiment wells. Two types of fractures have significance to the determination of in-situ stresses. Scribeline fractures originate at orientation grooves on the surface of the core and were caused by scribing knives in the core barrel minutes after the core was cut free from the surrounding rock. Their strike reflects the maximum in-situ horizontal stress direction that has been determined in these wells by anelastic strain recovery measurements. Drilling-induced petal and petal-centerline fractures from the same intervals of core formed just below the advancing core bit. They have a strike that is controlled by a combination of the in-situ stress and the shear stress created by the rotation of the bit. Greater shear stress produced more rotation of the fracture strike clockwise from the known maximum in situ principal horizontal stress orientation. The contrast in the strikes of the two types of fractures in the same intervals of core is a function of whether the core was free-standing in the core barrel or still part of the rock mass below the rotating bit at the time of fracturing. In simple situations, orientations of these types of fractures may be used to determine the relative orientation between the in-situ stress and natural fractures, and ultimately whether a stimulation fracture will parallel or intersect natural fracture permeability systems in a reservoir.

47129 **Relation of sedimentologic features and reservoir quality in a shelf ridge sandstone deposit - comparison of outcrop and subsurface properties.** Jackson, S.R.; Szpakiewicz, M.; Tomutsa, L. (National Institute for Petroleum and Energy Research, Bartlesville, OK). *AAPG Bulletin;* **71**: No. 5, 571(May 1987). (CONF-870606—).

From American Association of Petroleum Geologists annual meeting; Los Angeles, CA, USA (7 Jun 1987).

The High Energy Ridge Margin (HERM) facies of the Shannon Sandstone in the Salt Creek anticline area of the Powder River basin, Wyoming, is comprised of fine to medium-grained glauconitic sandstone (82%), which is cross-bedded, rippled, and burrowed, and shale and limonitic clay (18%). Histograms of log permeability-to-air values measured from 214 1-in. diameter cores drilled from the face of an outcrop of the HERM facies of the lower Shannon indicate the existence of two major permeability populations. These two permeability populations can be related to cross-bedded sandstone (higher permeabilities), and noncross-bedded, rippled, and burrowed sandstone with clay laminae (lower permeabilities). Examination of the HERM facies in upper Shannon cores from Teapot Dome oil field, located 5 mi from the studied outcrop at a depth of 300 ft, indicate similar sedimentologic features and similar permeability populations related to cross-bedded and noncross-bedded subfacies within the HERM facies. Comparisons of permeability and porosity histograms, cumulative distribution functions, correlation lengths, and natural logarithm of permeability versus porosity plots also indicate a strong similarity in HERM reservoir properties between outcrop and Teapot Dome field. The similarities of outcrop and Teapot Dome permeabilities and porosities, which are from the same geologic facies but from different depositional episodes (upper and lower Shannon), suggest that rocks deposited under similar depositional processes within a given deposystem have similar reservoir properties.

47130 **Mixed fluvial systems of Messak Sandstone, a deposit of Nubian lithofacies, southwestern Libya.** Lorenz, J.C. (Sandia National Labs., Albuquerque, NM). *AAPG Bulletin;* **71**: No. 5, 585(May 1987). (CONF-870606—).

From American Association of Petroleum Geologists annual meeting; Los Angeles, CA, USA (7 Jun 1987).

The Messak Sandstone is a coarse to pebbly, tabular cross-bedded, Lower Cretaceous deposit of the widespread Nubian lithofacies. It was deposited at the northern edge of the Murzuq basin in southwestern Libya. Although the sedimentary record is predominantly one of braided fluvial systems, a common subfacies within the formation is interpreted to record the passage of straight-crested sand waves across laterally migrating point bars in sinuous rivers similar to the pattern documented by Singh and Kumar on the modern Ganga and Yamuna Rivers. Because the sand waves were larger on the lower parts of the point bars, lateral migration created diagnostic thinning-upward, unidirectional cosets of tabular cross-beds as well as fining-upward, grain-size trends. Common, thick, interbedded claystones, deposited in associated paludal and lacustrine environments, and high variance in cross-bed dispersion patterns also suggest the local presence of sinuous fluvial systems within the overall braided regime. The Messak Sandstone contains some of the features that led Harms et al to propose an unconventional low-sinuosity fluvial environment for the Nubian lithofacies in Egypt, and the continuously high water levels of this model may explain channel-scale clay drapes and overturned cross-beds in the Messak. However, most of the Messak characteristics are incompatible with the low-sinuosity model, suggesting instead that the fluvial channels in the Murzuq basin alternated between braided and high-sinuosity patterns.

47131 **Submarine debris-flow, slump-block, and turbidite deposits in Mancos Shale (Cretaceous) of northwestern Colorado.** Lorenz, J.C.; Muhr, C.A. (Sandia National Labs., Albuquerque, NM). *AAPG Bulletin;* **71**: No. 5, 585(May 1987). (CONF-870606—).

From American Association of Petroleum Geologists annual meeting; Los Angeles, CA, USA (7 Jun 1987).

The resistant ledges within the Mancos Shale on the slopes of Mount Garfield near Grand Junction, Colorado, have long been ignored or explained as geomorphic features. However, sedimentologic study has shown that there are three significantly different types of Cretaceous submarine deposits interbedded with the Mancos in this part of the Book Cliffs. (1) The lowest ledges consist of millimeter to meter-scale unsorted rip-up clasts of Mancos mudstone and shallow marine sandstone that overlie planar contacts marked by shear-zone lineations. Lenses of this intraclast conglomerate are up to 20 m thick and several hundred meters wide, have steep, erosional margins, and are interpreted as submarine debris flows. (2) A 14-m thick interval just below the upper ledge consists of an amalgamation of sandstone-shale laminations, each a few centimeters thick and each laterally extensive and heavily burrowed. This is a distal turbidite fan. (3) The upper ledge, at least 500 m in extent and 20 m thick, consists of large (tens of meters) slump blocks of Mancos Shale that are rotated to dip toward the paleoshoreline. These overlie a planar base that is marked with lineations

similar to that of the debris flows. Offset bedding along internal shear planes records reconfiguration within the large blocks as they conformed to the flat basal contact during and/or after slumping. Although turbidites are now commonly recognized in the Cretaceous shales of the Western Interior, debris-flow intraclast conglomerates and large-scale slump blocks have not been widely reported. These deposits have implications for water depths, submarine slope angles, and sea bed configuration with the Western Interior seaway. Some may represent the sedimentary expression of the shelf-edge break in slope.

0203 Drilling And Production

47132 **(CMI-R—862331-1) Petroleum field optimization. Comments on models and solution techniques.** Hallefjord, Aa.; Asheim, H.; Haugland, D. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Dec 1986. 81p. NTIS (US Sales Only), PC A05/MF A01. File Number DE87753073.

The subject of this report is that of optimizing the management of a hydrocarbon reservoir. Many mathematical models have been suggested as approaches to this very general problem. The report is concentrated on mathematical programming and optimal control models which include a two-dimensional reservoir description. This limitation is not so severe, since extensions to a three dimensional geometry usually are straight-forward. The emphasis is on modelling, but comments are given on conceivable solution techniques and the computational burden that can be expected in each case. 5 figures. 72 references.

47133 **(DOE/FE/60600—T14) Naval Petroleum Reserve No. 2: Buena Vista Oil and Gas Field, Kern County, California: Proved reserves, Developed and undeveloped, Sections 6 and 8: Development history and exploitation techniques, Effective July 1, 1987: [Final technical report].** Carey, K.B. (Evans, Carey and Crozier, Bakersfield, CA (USA)). 9 Sep 1987. Contract AC01-85FE60600. 597p. NTIS, PC A25; 3; GPO Dep. File Number DE87014737.

The research for the initial Naval Petroleum Reserve No. 2 (NPR-2), study Task Assignment 010, showed the possibility of undeveloped proved reserves in the Shallow Pool on Government leases. Task Assignment 010C included a study to confirm or disprove the possibility. The six-section area, which is highlighted on Exhibit M-2, was chosen as the area for specific study of this subject. The Shallow Oil Zone, as depicted on Exhibit S-1, was the focal point of the study in the area. Competitive development of Government land with adjacent privately held land is an issue which has often been raised regarding NPR-2; however, it has never been formally addressed. Task Assignment 010C commissioned a study of the subject in the same six-section area designated for the study of proved undeveloped reserves. The producing formations in the Buena Vista Field of NPR-2 are very similar to the producing formations in the Elk Hills Field of NPR-1 to the north. It is possible that some of the successful development techniques utilized in NPR-2 by the various operators might enhance production efficiency at NPR-1. Task Assignment 010C included a detailed task of researching techniques used in NPR-2 for possible application in NPR-1. Because the detailed tasks of Task Assignment 010C are divergent in scope, a composite summary of the study's research is not included in this report. Each task's research is detailed in a separate Discussion section. Exhibits for these discussions are contained in an Exhibit section at the end of this volume. The appendices include: task assignment; DOE letters to lessees; Evans, Carey & Crozier letters to lessees; reports and studies from lessees; core analysis data; production data; geologic picks of formation tops; and annotated well logs. 22 figs., 6 tabs.

47134 **(NIPER—228) Carboxymethylated ethoxylated surfactants: Annual report.** Olsen, D.K.; Josephson, C.B. (National Inst. for Petroleum and Energy Research, Bartlesville, OK (USA)). Aug 1987. Contract FC22-83FE60149. 58p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87001258.

A method of selecting surfactants for chemical enhanced oil recovery using carboxmethylated ethoxylated surfactants (CES) is described. Structure/performance correlations for hydrophobe, ethylene oxide content, and nonionic-anionic ratio have been developed for a series of CES with alkane carbon number, pH, salinity, phase inversion temperature, and solubilization parameter to provide a guide in selecting candidate surfactants for enhanced oil recovery. Carboxymethylated ethoxylated surfactants are a class of surfactants that generate low interfacial tension against crude oils at high temperatures, high salinities and high divalent ion concentrations. Selection of the surfactant for a specific reservoir can be made based upon determination of the phase inversion temperature (PIT) of the surfactant at reservoir salinity with live crude. An additional scan for phase behavior (salinity scan) can then establish salinity tolerance and solubilization parameters for the selected surfactant system. Correlations of PIT with surfactant structure, salinity, and hydrocarbon have been determined for a number of US reservoirs using CES as the only surfactant. 67 refs., 20 figs., 3 tabs.

47135 **(UCID—21059) The federal Outer Continental Shelf leasing program in northern California.** Borg, I.Y. (Lawrence Livermore National Lab., CA (USA)). 12 May 1987. Contract W-7405-ENG-48. 9p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013074.

The proposed Federal offshore tract sales now tentatively scheduled for 1989-1992 have been postponed numerous times due to objections from Californians and their Congressional representatives. This review deals with the history of OCS sales in Northern California, estimates of the size of the undiscovered resource, i.e., the "target," results of past drilling following earlier lease sales, likely areas of greatest interest in future federal sales and location of areas excluded from consideration on environmental grounds.

0205 Products And By-products

REFER ALSO TO CITATION(S) 47036

47136 **(AD-A—182029/9/XAB) Advanced aircraft-fuel evaluation. Phase 1. Final report, June 1986-January 1987.** Ganguli, P.S.; Kydd, P.H. (Partnerships Ltd., Lawrenceville, NJ (USA)). Mar 1987. 78p. NTIS, PC A05/MF A01.

The objective of this project was to provide estimates of the availability, cost, and quality of naphthenic hydrocarbon fuels for advanced hypersonic vehicle propulsion as a function of time. To accomplish this objective, a proposed specification of the fuel was established. Potential sources of feedstocks were surveyed with particular attention to petroleum-based refinery streams. Three promising feedstocks were identified in addition to purchased petroleum-derived naphthalene, which served as the bases of comparison. Processing routes to convert the identified feeds to specification fuel were identified. These are based on existing refining technology and require no process innovation or research for successful fuel production. The samples of the proposed fuel substantially met the desired properties of the advanced fuel. In addition, rate constants were derived for the hydrogenation of naphthalene and the cis–trans-isomerization of decalin. Other rate constants relevant to the production of advanced fuel from refinery feedstocks were also measured. The requirements for the design of the aircraft system to use these fuels were estimated. The availability and cost of advanced fuels from the identified refinery streams were estimated, and a possible scenario for supplying this fuel through the year 2000 was developed. The advanced fuel in question is intended for application in hypersonic aircraft of the future, particularly those intended for high Mach flight with extensive fuel cooling of the airframe and engine.

47137 **(AD-A—182118/0/XAB) Evaluation of naphthene-rich turbine fuels as heat sinks for hypersonic aircraft. Final report, July-December 1986.** Lillis, B.J. (J and A Associates, Inc., Golden, CO (USA)). Jan 1987. 101p. NTIS, PC A06/MF A01.

A three-phase program was undertaken to evaluate the current domestic production of naphthene-rich turbine fuels. The first phase was a refinery survey to determine the magnitude of this production and its quality. Hydrocracker effluents are the chief source of these streams, and their turbine fuel cut is approximately 500,000 barrels per day. Samples were obtained from 20 domestic refiners and characterized for their naphthene and sulfur contents. Most

sulfur contents were low, <2wppm, and the naphthene contents ranged from 18 to 52 mole percent.

47138 **(AD-A—182196/6/XAB) Laboratory characterization tests for antimisting fuel. Final report.** Wilson, J.J. (Federal Aviation Administration, Atlantic City, NJ (USA). Technical Center). Mar 1987. 127p. (DOT/FAA/CT—86/23). NTIS, PC A07/MF A01.

Experiments have shown that FM-9 antimisting fuel had the potential for precluding the fine mist and associated fireball generation in aircraft post-crash situations while allowing for the restoration of the filtration and antomizing characteristics required for aircraft operation. The Federal Aviation Administration, the Aircraft Establishment, the National Aeronautics and Space Administration, the Jet Propulsion Laboratory, Southwest Research Institute, and Pratt and Whitney Aircraft developed many specialized laboratory characterization tests throughout the antimisting fuel program to evaluate the antimisting properties, the degradability, the composition, and rheological properties of FM-9 antimisting fuel and the physical properties of FM-9 slurry used in the inline blending process for anitmisting fuel. This report documents all the laboratory characterization tests that were successfully developed and used as a standardized test method during the program.

47139 **(AD-A—182303/8/XAB) Analysis of middle-distillate fuels by high-resolution field-ionization mass spectrometry. Annual report (Final), 1 June 1982-November 1986.** Malhotra, R.; Coggiola, M.J.; Young, S.E.; Tse, D.S.; Buttrill, S.E. (SRI International, Menlo Park, CA (USA)). May 1987. 85p. NTIS, PC A05/MF A01.

An analytical method was developed for the rapid and detailed chemical characterization of distillate fuels using high-resolution field-ionization mass spectrometry (HR-FIMS). Field ionization produces only the molecular ions for most compounds and is, therefore, particularly useful for the analysis. A vintage AEI MS-9 mass spectrometer was refurbished and modified to house an SRI volcano-style field ionizer. By operating the mass spectrometer at a resolving power of 3000, all the hydrocarbon z-series present in the fuel can be resolved. Software was written for sorting the peaks according to their z-series, applying the appropriate response factors, printing and plotting the reports, and averaging replicate analyses.

47140 **(AD-A—182558/7/XAB) High-temperature hot-corrosion control by fuel additives (contaminated fuels). Final report, October 1985-December 1986.** Rathnamma, D.V.; Nagarajan, R. (David W. Taylor Naval Ship Research and Development Center, Annapolis, MD (USA). Ship Materials Engineering Dept.). Jun 1987. 29p. (DTNSRDC/SME—87/41). NTIS, PC A03/MF A01.

The potential of fuel additives to minimize corrosion of blade material was analyzed by the following series of steps: first, a computer program was-employed for an equilibrium-thermodynamic prediction of condensed solution composition; next, relevant physico-chemical properties of the molten solution were estimated based on predicted equilibrium composition; then oxide solubility and dissolution rates are calculated for this solution in contact with various solid oxides. Finally, we compare our predicted oxide dissolution-rate results with available experimental hot corrosion rate data, seeking verification of the model for the rate determining process - i.e., oxide dissolution - in hot corrosion.

47141 **(AD-A—182720/3/XAB) Antimisting fuel (AMK) flight degrader development and aircraft-fuel-system investigation. Final report, March 1983-December 1985.** Coffinberry, G.A.; Tucker, T.M. (General Electric Co., Cincinnati, OH (USA). Aircraft Engine Business Group). Feb 1987. 121p. (R—86AEB565). NTIS, PC A06/MF A01.

This report summarizes results from a 20-month technical effort involving the design, fabrication, and evaluation of an Antimisting Kerosene (AMK) degrader. The principal objective was to demonstrate the feasibility of employing a high-speed centrifugal pump to condition AMK fuel for use in an aircraft turbine engine. The effects of AMK fuel on the engine airframe fuel system as well as any effect the flight environment might have had on the fire-preventive characteristics of the AMK were also investigated. Five functionally identical degrader systems were produced. The first system was installed on the No. 3 engine of a CV880 aircraft with a dedicated AMK fuel tank. This system accumulated about 45 hours of engine operation on AMK, 30 of which were in-flight. The remaining four degrader systems were installed on a B720 aircraft that was used in the Full-Scale Transport Controlled Impact Demonstration (CID). The degrader systems performed well and met the objectives of both the CV880 and the CID programs. In the early phases of the CV880 flight test program, gelling was observed on a number of the engine fuel filters. Three distinct types of gel subsequently were identified. The mechanisms involved in the formation of all the gels were not fully understood by the end of the program. Aside from the intermittent occurrence of gel, little difference in performance could be distinguished between the No. 3 engine, operating on AMM4K, and the No. 2 reference engine, operating on Jet A.

0206 Health And Safety

REFER ALSO TO CITATION(S) 47044

47142 **(SI-R—850201-2) GASKICK - a knowledge based system for drilling supervision and gas kick detection.** Arff, S. (Senter for Industriforskning, Oslo (Norway)). 19 Mar 1986. 39p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753071.

A rule based system, GASKICK, is described which demonstates the application of knowledge based systems technology in drilling supervision and gas-kick detection and warning. The system utilizes goal-directed search and incorporates an explanation mechanism. GASKICK has been programmed in LISP (ca 800 lines of code) and the demonstration version has ca 50 rules. 6 refs., 10 figs.

47143 **Chemical and toxicological characterization of residential oil burner emissions. II. Mutagenic, tumorigenic, and potential teratogenic activity.** Braun, A.G.; Busby, W.F. Jr.; Liber, H.L.; Thilly, W.G. (Massachusetts Institute of Technology, Cambridge). *Environmental Health Perspectives;* **73**: 235-246(Aug 1987). Contract AC02-83ER60174.

Extracts of effluents from a modern residential oil burner have been evaluated in several toxicological assay systems. Bacterial mutagens were detected in extracts from both the particulate and vapor phase emissions. Effluents from continuous operation were an order of magnitude less mutagenic than those from cyclic (5 min on, 10 min off) operations. No difference in the yield of bacterial mutagens per gram of fuel burned was found between cyclic operation under low and moderate sooting conditions. On the basis of elution behavior from alumina it appeared that the bacterial mutagens collected from high sooting effluents were more polar than those from low sooting effluent. An extract that was mutagenic in bacteria did not induce a significant increase in mutation frequency to human lymphoblasts. No evidence of tumorigenicity was observed in a limited number of newborn mice after IP injection of effluent extract when compared to historical control data. Putative nonmutagenic teratogens were detected in effluent using an attachment inhibition assay. The level of these agents was reduced in effluents from continuous oil burner operation.

0207 Marketing And Economics

REFER ALSO TO CITATION(S) 47168, 47268

47144 **(CMI-R—852050-2) Weak form efficiency of the International Petroleum Exchange.** Bird, P.J.W.N. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Mar 1985. 29p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753078.

The hypothesis that prices follow a random walk is tested using daily data for 1981 to 1984 for six traded positions on the London International Petroleum Exchange gas oil futures market. The method uses a filter test statistics to evaluate possible dependencies in the movement domain. The only evidence for dependency detected is a tendency for reversal of large price changes. This is not sufficient to sustain a conclusion that the market is weak-form inefficient. The results are compared with those for the gas oil spot

market, and for the other London futures markets. 11 references,. 14 tables.

47145 **(CMI-R—852230-1) Retrospective simulation of oil demand and crude oil production. A basis for crude oil prices scenarios.** Haaberg, T. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Sep 1985. 47p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753074.

A simple system-dynamic model of the world crude oil market is presented. To forecast the crude oil price, a simulation approach is chosen, and a simulation model of the world crude oil market has been developed. To establish empirical credibility of the model, bits and pieces of it have been tested against time series data. This was done through a trial and error process, where model structure and parameters were adjusted to give the best possible fit to history. A few oil price scenarios are presented. These scenarios illustrate some advantages of the simulation approach. With a quantitative model comprehending important aspects of the world crude oil market, it is possible to calculate consistent price and volume scenarios, based on varying sets of assumptions regarding market structure and the development of exogenous variables. 15 figures.

47146 **(CMI-R—852310-10) Investment appraisal in reservoir economics.** Thon, D.; Amundsen, E.S. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Dec 1985. 16p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753075.

The report discusses the assumptions underlying alternative objective functions, which can be used in economic studies based on a reservoir model. The model is a simplified one with few control variables, such as depletion rate and number of wells. The purpose of the model is to identify the optimal combination of values which maximizes some objective function. A particular attention is paid to comparing objective functions based on the net present value (NPV) and the internal rate of return (IRR). The situation where there is no uncertainty is first considered. In this case the conclusion is that a mature firm with access to the capital markets should choose the project with the highest NVP, taking into account possible interdependences. In some circumstances it is not reasonable for a small firm which is in effect forced to grow to a larger size, to maximize the IRR. Finally, uncertainty is introduced. The purpose is not to give a fullfledged treatment of uncertainty but to indicate in what way the conclusions reached under certainty are affected by the introduction of uncertainty.

47147 **(CMI-R—852455-2) Some aspects of tax progressivity in natural resources taxation.** Thon, D. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Mar 1985. 17p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753072.

The paper deals with a well-defined subset of the issues raised by the functional relationship between tax and tax basis in a natural resource tax system. The question asked is: What are the necessary and/or sufficient properties of the tax system such that the decisions taken under uncertainty by the companies are consistent with social welfare, i.e are the same decisions as would be taken by the Society. It is shown that those properties are closely related to progressivity. Particular care has been taken to formulate both private and social decision criteria. Expected utility criteria are the only really decisive ones, and they are formulated directly in terms of stochastic dominance. 7 references. 6 figures.

47148 **(CMI-R—852455-3) Alternative petroleum taxation systems. Comparisons under uncertainty.** Thon, D. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Dec 1985. 25p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753076.

This paper considers the three most common forms of petroleum taxation: a profit tax, a royalty and a fixed fee. Conventional wisdom holds that at a constant expected post-tax payoff, a risk-averse agent will prefer to be subjected to a profit tax rather than to a royalty and to the latter rather than to a fixed fee. This paper reconsiders this ranking by rigorously approaching the problem in an expected utility framework and derives sufficient conditions for unambiguous ranking of the alternative tax systems. 6 references.

47149 **(DOE/EIA—0109(87/06)) Petroleum supply monthly, June 1987.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). 27 Aug 1987. 101p. NTIS, PC A06/MF A01 - GPO; 1; GPO Dep. File Number DE87014541.

Summary statistics address crude oil and petroleum products disposition and imports; finished motor gasoline; distillate fuel oil; residual fuel oil; liquefied petroleum gases; and other petroleum products. (PSB)

47150 **(DOE/EIA—0292(86)) An assessment of the quality of selected EIA [Energy Information Administration] data series: Petroleum supply data.** (USDOE Energy Information Administration, Washington, DC. Office of Statistical Standards). 4 Aug 1987. 66p. NTIS, PC A04/MF A01 - GPO; 1; GPO Dep. File Number DE87014539.

This report is part of a series that presents information on the quality of the Energy Information Administration's (EIA) data estimates. It covers a portion of EIA's petroleum supply data and is intended to inform users of the strengths and limitations of those data. Two approaches are used to obtain information on the quality of the petroleum supply data: (1) comparisons with other similar series and (2) identification of anomalous values within a data series. Both approaches look for symptoms of problems in the data. Previously, EIA conducted validation studies that examined each stage of the data collection. However, there was no fully satisfactory way to obtain estimates of error associated with each stage of the data collection and to sum them to produce an estimate of total error. These studies were also very expensive and were eventually discontinued.

47151 **(NP—7900936) Petroleum supply assessment '87: Technical report.** (New York Energy Ofice, Albany (USA). Div. of Policy Analysis and Planning). Aug 1987. 42p. Charles R. Guinn, New York State Energy Office, Agency Building No. 2, Empire State Plaza, Albany, NY 12223-0001. File Number TI87900936.

Consumers across New York State depend on petroleum products for a diverse range of end uses in all economic sectors. New Yorkers are more dependent on oil than the nation as a whole. Petroleum fuels in 1985 accounted for more than twice as much energy as any other single primary resource. Petroleum accounted for 50.1% of the statewide total energy requirement. Nationally, petroleum accounted for 41.8% of total energy needs in 1985. As a result of oil price declines throughout most of 1986, use of petroleum products increased, capturing an even greater share of total energy consumed in the state. While oil products are vital to the economy of New York State, no strong indigenous resource base exists to satisfy this need. The state lacks an active refinery industry and has only limited oil production potential. The closing and dismantling of both the Mobil and Ashland refineries in Western New York during the early 1980's, with their combined capacity of 103,000 barrels per day (b/d), coupled with the infrequent operation of the Cibro refinery in Albany, has effectively eliminated the refining segment of the statewide supply network. Also, East Coast refineries, an important source of petroleum products to consumers statewide, have been closing since 1980 as suppliers restructured their marketing programs. Consequently, the statewide distribution system is weakened and has less flexibility to provide petroleum products on a timely basis to upstate markets.

47152 **(ORNL—6400) Navy Mobility Fuels Forecasting system: Phase 3, Report.** Hadder, G.R.; Das, S.; Lee, R.; Davis, R.M. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 115p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE87014956.

The world oil scenarios were analyzed using the NMFFS. The linear programming models of the NMFFS have great value in the analysis of petroleum resource allocation and refining. The results of the general market analysis indicated that all disruptions resulted in reduced crude oil supply, higher prices, and reduced demand in the world. In a major Persian Gulf disruption, US refining capability appeared adequate to satisfy normal US military fuel requirements, including those supplied by foreign refiners. However, this would be at the expense of civilian fuels production. Mobili-

zation fuel requirements during a major disruption that curtailed most Persian Gulf and Venezuelan crude exports resulted in significant competition in the production of civil versus military jet fuels, particularly in Texas Gulf Coast and West Coast refineries. In all disruption scenarios studied, the Middle East emerged as a potentially important refiner of both civil and military jet fuels. With SPR drawdown and the IEA agreements in effect, the impacts of the disruptions on the production of refined products were significantly reduced, particularly in the United States, compared to the impacts without these programs. The IEA agreement caused a redistribution of the regional demand levels among IEA countries in favor of the major oil consuming countries like the United States, Canada, and some of the European countries. The results of the RYM analysis of refinery regions focused on the availability and quality of JP-5 production in key Navy supply regions. Several findings potentially important to the Navy are listed.

47153 **(ORNL/TM—10519) A compact model of oil supply disruptions.** Reister, D.B. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 42p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000034.

We have developed a model of oil price jumps caused by oil supply disruptions. The core of the model is a compact general equilibrium model of oil demand. Given an exogenous forecast of oil supply and potential GNP for the world, the model can forecast the oil price, real GNP, and value added for the world. The data base for the model consists of historical time series of world oil supply, world oil price, and growth rates for world GNP. The data demonstrate that small changes in oil supply are associated with large changes in oil price. If a large change in oil price causes a small change in oil consumption, the short-run price elasticity of demand must be small. We have specified a model with a short-run and a long-run price elasticity. The six parameters in the model have been estimated using historical data for three cases. The initial model had five parameters. For Case 1, we used a search procedure to determine the parameters that minimized the root mean square (RMS) of the differences between the price backcast by the model and the historical data on oil price. We found that the RMS error was 121% and that the price calculated by the model was too low for the period from 1974 to 1980. After a review of the historical data on oil consumption, oil price, and world GNP, we concluded that the response of the world oil market to the 1974 oil price shock was different than the response to the 1979-80 oil price shock. To improve the model's capacity to simulate the historical data, we introduced a technological change factor that increases the demand for oil in the period from 1971 to 1979. For Case 2, the rate of technological change is 3.8% and the RMS error is 35%. For Case 3, the rate of technological change is 7.0% and the RMS error is 35%. Although Case 3 has the smallest error, we concluded that the Case 2 set of parameters provided the best match for the historical data on world oil price. 13 refs., 9 figs., 1 tab.

0209 Environmental Aspects

REFER ALSO TO CITATION(S) 48522

47154 **(IVL-B—823) Recolonisering of oil polluted beaches.** Notini, M. (Swedish Environmental Research Inst., Stockholm; Swedish National Board for Technical Development, Stockholm). May 1986. 39p. (In Swedish). (STU—82-4253). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753357.

Marine organisms sensitive to long term effects of oil spills (1-10 years) have been studied. Organisms with limited mobility and low reproduction rate have been identified as a rich group. Shells living in shallow waters are members of this group. A technique for enhanced recovery of organisms after an oil accident have been tested in plot scale in this project. Organisms have been successfully reimplanted with help from algae fetched from unpolluted areas (Bok). With 11 refs.

47155 **(PB—87-198875/XAB) Research to determine the accumulation of organic constituents and heavy metals from petroleum-impacted sediments by marine detritivores of the Alaskan Outer Continental Shelf. Final report.** Anderson, J.W.; Roesijadi, G.; Augenfeld, J.M.; Riley, R.G.; Credilius, E.A. (National Ocean Service, Anchorage, AK (USA). Ocean Assessments Div.). Apr 1980. 145p. NTIS, PC A99/MF E04.

The major objective of this research program was to investigate the fate of petroleum hydrocarbons in the water column and intertidal zone and their bioavailability to, and effects on, the biota. The work has advanced the level of knowledge by demonstrating that exposure to petroleum hydrocarbons in sediments can result in accumulation and retention of heavier polynuclear aromatic hydrocarbons, but does not enhance uptake of trace metals.

47156 **(PB—87-198883/XAB) Suspended particulate matter distribution, transport, and physical characteristics in the North Aleutian Shelf and St. George Basin lease areas.** Baker, E.T. (National Ocean Service, Anchorage, AK (USA). Ocean Assessments Div.). Jan 1983. 140p. NTIS, PC A99/MF E04.

The principal objective of this research unit was to describe the distribution, transport, and physical characteristics of suspended particulate matter (SPM) in the area of the North Aleutian Shelf (NAS) and St. George Basin (SGB). These data are required to assess the effect that the natural particle population in these waters might have on the transport and dispersal of spilled oil.

47157 **(PB—87-202016/XAB) Final environmental impact statement. Proposed Norton Basin Sale 100. Volume 1.** Emerson, R.; Yoesting, L. (Minerals Management Service, Anchorage, AK (USA). Alaska Outer Continental Shelf Region). Dec 1985. 610p. (MMS/AK/EIS—85/005). NTIS, PC A99/MF A01.

See also Volume 2, PB—87-202024; Color illustrations reproduced in black and white.

This Environmental Impact Statement analyzes a proposed oil and gas lease sale in the Norton Basin, alternatives to the proposal, major issues determined through the scoping process, and potential mitigating measures. The proposal consists of 1,755 blocks, located in the Norton Basin Planning Area in waters that are from about 5 to 130 kilometers (3-81 miles) offshore. The mean economically recoverable resources unleased in the area are estimated to be 282 million barrels of oil and 1,552 billion cubic feet of gas with a marginal probability of 0.12 for hydrocarbons.

47158 **(PB—87-202024/XAB) Environmental impact statement. Proposed Norton Basin Sale 100. Volume 2.** (Minerals Management Service, Anchorage, AK (USA). Alaska Outer Continental Shelf Region). Dec 1985. 413p. (MMS/AK/EIS—85/006). NTIS, PC A18/MF A01.

See also Volume 1, PB—87-202016.

This Environmental Impact Statement analyzes a proposed oil and gas lease sale in the Norton Basin, alternatives to the proposal, major issues determined through the scoping process, and potential mitigating measures. The proposal consists of 1755 blocks, located in the Norton Basin Planning Area in waters that are from about 5 to 130 kilometers (3-81 miles) offshore. The mean economically recoverable resources unleased in the area are estimated to be 282 million barrels of oil and 1552 billion cubic feet of gas with a marginal probability of 0.12 for hydrocarbons.

47159 **(PB—87-207106/XAB) Barrow Arch transportation-systems impact analysis. Social and economic studies program technical report number 104. Final report.** (ERE Systems Ltd., Arlington, VA (USA)). Dec 1984. 403p. NTIS, PC A18/MF A01.

This report evaluates future effects on regional air, marine, highway, rail, and pipeline transportation systems from Outer Continental Shelf (OCS) petroleum development in offshore location known as the (Barrow Arch) Chukchi Sea Planning area. Future conditions without the OCS development mostly represent an extrapolation of current trends and conditions, while future conditions with the development are driven by an industrial-development sce-

nario prepared by MMS. The analysis looked at transportation services to the nearby North Slope Eskimo coastal villages of Point Lay, Point Hope, Wainwright, and Barrow; the more southerly coastal communities of Kivilina and Kotzebue, and the petroleum industry enclave at Prudhoe Bay/Deadhorse.

47160 **(PB—87-207213/XAB) Beaufort Sea petroleum technology assessment. Social and economic studies program technical report number 112. Final report.** Padron, D.V.; Han, E.H.Y.; Faeth, M.T.; Paparis, B.; Sackinger, W.M. (Han-Padron Associates, New York (USA)). Mar 1985. 560p. NTIS, PC A24/MF A01.

See also PB—82-190166.

The objective of the study were to assess the state of petroleum technology in the region of the Diapir Field Sale 97 and to analyze the unit costs, construction schedules, and manpower requirements associated with offshore petroleum development. Values for all relevant environmental parameters were established and the forces exerted on offshore structure were determined based on information available in the public domain. Assumed petroleum production parameters and potential sources of onshore and offshore granular barrow material are defined. The construction techniques unique to offshore development in the Beaufort Sea, along with relevant unit costs, are presented. Drilling techniques and costs for exploration and development wells are described as are ancillary vessel technology, manpower requirements and costs. Offshore operation in the study are will require onshore support facilities and base-camp requirements and costs are describes.

47161 **(PB—87-207247/XAB) Unimak Pass vessel analysis. Social and economic studies program technical report number 108. Final report.** Gibson, K.; Cook, P.; Pederson, J.; Hennigh, G. (Berger (Louis) and Associates, Inc., Anchorage, AK (USA)). Sep 1984. 50p. NTIS, PC A03/MF A01.

The report identifies present and future marine traffic and related characteristics of vessels using Unimak Pass. Present and future vessel traffic estimates through the year 2000 are developed for four categories: fishing; natural resources; commercial shipping; and Outer Continental Shelf (OCS) activities. Total annual vessel traffic for the year 2000 is estimated to increase approximately 100% over the base year from approximately 2290 trips to 4600 trips in 2000. The report assesses the impact, i.e., increase in collisions, of additional vessel traffic using Unimak Pass as a result of future OCS activities in northern and western Alaska. The OCS traffic almost doubles the likelihood of a collision in the pass by the year 2000. The collision rate in the Pass without OCS activity is estimated at one collision every 57 years, while the collision rate with OCS activity is estimated at one collision every 33 years in the year 2000.

0210 Legislation And Regulation

47162 **(NEI-DK—41) Exploration. Guidelines for drilling.** (Energistyrelsen, Copenhagen (Denmark)). Feb 1985. 72p. (In Danish and English). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753057.

These guidelines apply to approval and supervision, which in consequence of the Danish subsoil Act have been delegated to the Danish Energy Agency. Chapter 1 relates to exploration and appraisal wells for hydrocarbons and other minerals, offshore and on land as specified in Section 1 of the subsoil Act. However, some specifications have specific relevance for offshore wells or wells drilled to hydrocarbon targets, and may to a certain degree be irrelevant for other purposes. It must be noted that specifications are given as guidance and that other means of achieving corresponding conditions regarding safety and information might be approved.

0220 Transport, Pipelines, And Handling

REFER ALSO TO CITATION(S) 47168, 47268

0230 Properties

REFER ALSO TO CITATION(S) 47044, 47166

0240 Storage

REFER ALSO TO CITATION(S) 47561

47163 **(DOE/FE—0084-2) Strategic Petroleum Reserve quarterly report.** (USDOE Assistant Secretary for Fossil Energy, Washington, DC. Office of Petroleum Reserves). 15 Aug 1987. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000008.

This quarterly report describes activities undertaken with respect to the development of the Reserve during the period April 1, 1987 through June 30, 1987. The introduction and summary briefly discuss program background and major activities of this quarter. Section II describes site development. Oil acquisition activities are reported in Section III. Other program topics are discussed in Section IV. Information on the budget and cost of the Reserve is contained in Section V. During the second quarter of 1987, Strategic Petroleum Reserve storage capacity reached 570 million barrels. At Bryan Mound, final corrective leaching was completed in Cavern 5 whose conversion from sweet to sour crude oil storage is proceeding on schedule. At West Hackberry, leaching was completed for Cavern 115 and proceeded in the four remaining caverns still under development. At the Bayou Choctaw site, Cavern 17 oil fill was initiated; this 10-million-barrel cavern currently contains over five million barrels of oil. At Big Hill, construction has progressed to the point that attainment of leaching capability by the end of September is on schedule. The total inventory of crude oil stored in the Strategic Petroleum Reserve reached 527,186,515 barrels during the quarter ending June 30, 1987. The average fill rate during the quarter was 79,119 barrels per day, and the weighted average delivered price during this quarter was $19.17 per barrel. Funds available for obligation in fiscal year 1987 include $526 million in the SPR Petroleum Account for the acquisition and transportation of crude oil and $262 million in the Strategic Petroleum Reserve Account for activities associated with storage facilities development and the operation and management of the Strategic Petroleum Reserve. Approximately $23 million of Strategic Petroleum Reserve Account funds will be carried over to reduce new budget authority required for the account in fiscal year 1988. 1 fig., 2 tabs.

47164 **(SAND—87-1694) Calculation of creep induced volume reduction of the Weeks Island SPR [Strategic Petroleum Reserve] facility using 3-D finite element methods.** Preece, D.S. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1987. Contract AC04-76DP00789. 37p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000109.

Creep induced storage volume reduction has been calculated for the bilevel room and pillar salt mine at the Weeks Island SPR facility where 73 million barrels (MMbbl) of crude oil are currently stored. The calculation was performed using three separate 3-D finite element models which represent the three categories of pillars found in the mine. The idealized pillars in the three categories are all 100 feet square. The first pillar model was 25 feet high with loading representative of the lower level of the mine. The second pillar model was 75 feet high with loading representative of the lower level and the third model was 60 feet high with loading representative of the upper level of the mine. Vertical and horizontal closures measured by Morton Salt over a six-year period are compared with calculated closures and found to be in good agreement. The volume change associated with each of the three pillar models was proportioned according to the mine volume it represents to obtain the total mine volume at each time step. The volume calculation spans the years 1955 to 2012 and indicates that the mine will exhaust its excess storage space in the early 1990's. This will re-

quire that several million barrels of oil be withdrawn from the mine during its planned lifetime. 22 refs., 17 figs., 5 tabs.

47165 **Gulf coast salt domes and the strategic petroleum reserve.** Magorian, T.; Smith, R.E.; Whittington, D.; Delaplane, W.H. (Dept. of Energy, Washington, DC). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—).

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

Jurassic salt of the early Atlantic Basin rose as diapiric domes both in interior and coastal areas of the Gulf Coast. The salt pushed upward through heavier siliceous sediments from intrusive ridges along basement faults, trapping large quantities of hydrocarbons. In western domes, accumulating sulfates were reduced bacterially by methane oxidation to produce carbonate caprock and sulfur; eastern domes have liitle caprock. Six shallow coastal domes have been developed for oil storage by the US Strategic Petroleum Reserve. One site is a former salt mine, and the remaining sites are leached caverns. Leaching produced saturated brines on the order of billions of barrels which required disposal in the Gulf of Mexico. Disposal was accomplished through a system of diffusers on the bottom, designed to prevent the buildup of a dense plume of more than a few parts per thousand above ambient. An extensive oceanographic research and monitoring program demonstrated that the discharge did not effect local biotic community or valuable fisheries.

47166 **Biogeochemical studies of crude oil stored in the United States' strategic petroleum reserve.** Giles, H.N.; Woodward, P.W.; Shay, J.; Neihof, R.A. (Dept. of Energy, Washington, DC). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—).

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

The Office of Strategic Petroleum Reserve maintains a comprehensive quality surveillance and assessment program to monitor crude oil for the twenty or more years it may remain in storage. This program also provides the data necessary to define the quality of the mixture of crude oil streams stored in individual caverns. Samples periodically collected from the caverns undergo a detailed analysis that includes whole crude properties, characterization of distillate and residue fractions, trace element analysis, stable isotope ratio analysis, and microbiological studies. Convection within the stored crude oil induced by the geothermal gradient of the salt apparently prevents density differentiation and stratification. Despite this convective mixing, sediment, water, waxes, and certain heterogeneous compounds indigenous to the crude settle out and form a sludge layer at the brine/oil interface. the effects of various commingled crude oil streams, aerobic & anaerobic bacteria and salt content of brine will be discussed. No deleterious changes in quality have been observed in crude oil stored for as long as nine years.

03 NATURAL GAS

REFER ALSO TO CITATION(S) 49160

0302 Geology And Exploration

REFER ALSO TO CITATION(S) 47122, 47126, 47162, 47555

47167 **(PB—87-215992/XAB) Exploration-production studies in newly drilled Devonian Shale gas wells. Annual report, February 1, 1986-January 31, 1987.** Graham, R.L. (Graham (Reuben L.), Inc., Charleston, WV (USA)). Feb 1987. 142p. NTIS, PC A07/MF A01.

See also PB—86-215746.

The Devonian Shale has been recognized as an important source of gas in the Appalachian Basin. The program aids producers in the collection of reservoir data not normally collected and assists in the evaluation of the effectiveness of zone selection, stimulation designs, and methods. A detailed logging, coring, and well-testing program is being conducted on twenty-eight newly drilled wells in three areas of the Appalachian Basin. Production and borehole TV surveys are being conducted on certain existing and newly drilled wells. Zones of gas are being identified. The geology and reservoir characteristics of the wells are being determined through the analyses of geohpysical logs, borehole TV, and surface-well testing data. Perferred wells for study are those with single-zone well completions stimulated by hydraulic-fracturing techniques. Stimulation techniques, selected by the respective producers, are being evaluated using a prescribed well-test analysis procedure to determine their effectiveness.

0303 Drilling, Production, And Processing

REFER ALSO TO CITATION(S) 47135, 47167

47168 **Liquefaction of natural gas to methanol for shipping and storage.** O'Hare, T.E.; Sapienza, R.S.; Mahajan, D.; Skaperdas, G.T. (Brookhaven National Lab., Upton, NY 11973). pp 1108-1115 of Proceedings of the 1986 international gas research conference. Cramer, T.L. Rockville, MD; Government Institutes Inc. (1986). (CONF-860904—).

From International gas research conference; Toronto, Canada (8 Sep 1986).

The use of conventional methanol synthesis technology to compete with LNG is evaluated a number of times and, in all cases, the LNG route has proved economically superior. A radically new methanol synthesis process is conceived at Brookhaven National Laboratory and a research program has shown the expected operating characteristic of the expected process. To assess the economic viability of this BNL methanol synthesis, a complete process plant was designed using the research data on the process. The results show that the methanol process plant using the Brookhaven system designed for a production rate of 3,000 metric tons per stream dat requires an investment that is 50% of the investment for a conventional methanol synthesis using an up-to-date, improved design, and about 70% of an LNG plant delivering the same amount of energy. It is clear that the BNL methanol synthesis offers a very attractive improvement over LNG for delivery of natural gas values to overseas markets. Funds are now being sought actively to continue development of the BNL system beyond the research phase to confirm the advantages.

0306 Marketing And Economics

REFER ALSO TO CITATION(S) 47144, 47147, 47607, 47649, 47650

47169 **(CMI-R—862090-9) Western European natural gas market. Effects of import diversification constraints.** Brevik, A.K.; Aarrestad, J. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Dec 1986. 40p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753077.

A numerical partial equilibrium model of the Western European gas market is described. Four exporting countries (Algeria, The Netherlands, Norway and Soviet) and the six importing countries (Belgium, France, Italy, The Netherlands, UK and The Federal Republic of Germany) are included in the model. The aim of the study is primarily to provide some insight into the changes in the trade pattern and prices that would be caused by adherence to the import diversification policies recommended by the International Energy Agency. From the model calculations it is obvious that the self-imposed restrictions on Dutch natural gas exports are very important for the Western European natural gas market. The increase in Norwegian export due to import diversification constraints in West Germany is, e.g. to a large extent dependent on the Dutch export restrictions. Not unexpectedly, the results from the model calculations for the years 1990 and 2000 show that Norway's natural gas export increases when import diversification constraints are introduced in the model. In particular the limitations on German imports from the Soviet Union turn out to be important for this result. Somewhat paradoxically, total export from the Soviet Union to Western Europe increases when import constraints are introduced. Algeria, however, suffers huge losses in market share due to the constraints. 15 tables. 10 references.

47170 **(PB—87-211959/XAB) Basic gas metering. Annual report, April 1984-March 1985.** Brennan, J.A.; McManus, S.E.; Sindt, C.F.; Bateman, B.R.; Vazquez, I. (National Bureau of Standards, Boulder, CO (USA). Chemical Engineering Science Div.). May 1987. 84p. NTIS, PC A05/MF A01.

This is a status report on the work sponsored by the Gas Research Institute (GRI) on basic gas metering. The work was either completed at or subcontracted by the National Bureau of Standards in Boulder, CO (NBS-B). Tasks dealing with flow conditioning, secondary flow standards, an orifice data base, mathematical modeling, and interlaboratory comparisons are continuing efforts. Tasks dealing with a theoretical base for the orifice meter, sonic nozzle calibrations, orifice water calibrations, and orifice air calibrations are complete. The task dealing with the laboratory-quality orifice meter is in the final stages of completion. With the exception of the sonic-nozzle calibrations, the status of each of these tasks is described below. The report on the sonic-nozzle calibration will be published soon.

47171 **(PB—87-222683/XAB) Competitive position of natural gas: high-temperature fluid heating in petroleum refining and chemicals manufacturing. Topical report.** Holmes, J.G.; Olsen, K.G. (Energy and Environmental Analysis, Inc., Arlington, VA (USA)). Dec 1986. 158p. NTIS, PC A08/MF A01.

The study provides insights into the technological and important factors influencing the future competitiveness of natural gas-fueled fluid-heating technologies. The report focuses on the performance factors influencing the fuel and heater-equipment selection. It relates these performance factors to the capabilities of existing gas-fired equipment and to the requirements likely to be placed on new gas technologies. To quantify the competitive position of natural gas in fluid-heating applications, market profiles were developed to define current technologies and to characterize the applications and use of each technology in chemical and refinery operations. As part of the market characterization, important cost and performance parameters associated with each technology were identified and validated through interviews with industry representatives. Specific data and results presented in the report are useful to R&D managers, technology developers, and gas-utility-service representatives and planners.

0308 Environmental Aspects

REFER ALSO TO CITATION(S) 47157, 47158, 47159, 47160, 47161

0309 Artificial Stimulation

REFER ALSO TO CITATION(S) 47185

47172 **(PB—87-215927/XAB) Review of hydrologic testing in coal beds. Topical report, January 1985-December 1986.** Way, S.C.; Bumb, A.C.; Koenig, R.A.; McKee, C.R.; Reverand, J.M. (In-Situ, Inc., Laramie, WY (USA)). Mar 1987. 75p. NTIS, PC A04/MF A01.

Proper design of coal-bed methane production wells depends on knowledge of the target seam's hydrologic properties. Since conventional testing procedures to determine these properties are largely untried on coal seams, the goal of this research was to select coal-bed methane projects where field hydrologic tests have been conducted and evaluate their effectiveness. Specific hydrologic test procedures suitable for characterizing the unique reservoir properties of coal-beds are shown to provide the detailed characterization necessary to meet the initial objectives of GRI's two major field-based projects, the Deep Coal Seam Project and the Multiple Coal Seam Project. The report discusses the multiple-well interference test used to determine porosity-compressibility product and directional permeability properties of the target seams at Rock Creek, Alabama, and other single-well test methods to determine gas desorption pressure, hydraulic-fracture characteristics, and porosity-compressibility product in low-permeability formations. The slug test, in particular, is shown to be a versatile and reliable way to obtain basic coal-seam hydrologic information.

47173 **(PB—87-218178/XAB) Tight gas sands research program: field operations and analysis. Operating GRI's (Gas Research Institute's) mobile testing and control facility. Annual report 1986.** Holditch, S.A.; Robinson, B.M.; Whitehead, W.S.; Ely, J.W. (Holditch (S.A.) and Associates, Inc., College Station, TX (USA)). Jan 1987. 102p. NTIS, PC A06/MF A01.

See also report for 1985, PB—87-222742.

In 1986, work in the Gas Research Institute's (GRI) Tight Gas Sands program continued in the Travis Peak formation of East Texas. Four primary wells were included in the field-data-collection program. These were: (1) the Marshall Exploration Werner Sawmill No. 5, Panola County, Texas; (2) the Arkla Expolration T. P. Scott No. 5, Harrison County, Texas; (3) the Mobil Producing G. E. Cargill No. 14, Harrison County, Texas; and (4) the S. A. Holditch & Associates Howell No. 5, Harrison County, Texas. The Howell No. 5 well was GRI's first Staged Field Experiment drilled specifically to conduct research on hydraulic fracturing. The report presents a summary of the work performed during 1986 and includes the results and conclusions obtained from the analysis of wells associated with the program. The authors also provide a status update on new research projects being performed and their plans for cooperative research on wells in the Travis Peak formation during 1987. Also, within the report are brief discussions of geological, coring, and logging studies. Because each of these studies are individual projects, the authors do not present all of the data or results. Instead, the reader is referred to specific reports distributed by GRI which discuss these individual subjects in great detail.

47174 **(PB—87-218186/XAB) Tight-Gas-Sands Research Program: field operations and analysis. Cooperative-well report, Arkla Exploration, T.P. Scott No. 5, Harrison County, Texas.** Holditch, S.A.; Robinson, B.M.; Whitehead, W.S. (Holditch (S.A.) and Associates, Inc., College Station, TX (USA)). Jan 1987. 190p. NTIS, PC A09/MF A01.

See also PB—86-222742.

The Arkla Exploration T.P. Scott No. 5 in Waskom Field, Harrison County, Texas was drilled in May 1986. The well was cored and logged in the Travis Peak formation, and, using the GRI Mobile Testing and Control Facility, The authors monitored the pre-fracture test and the fracture treatment in the Cotton Valley formation. They combined the analyses from GRI's contractors and summarized their work in the Travis Peak as well as using their results in the analysis of the Cotton Valley completion. A low-resistivity sandstone was identified as possibly the best candidate for testing in the Travis Peak. Petrographic analyses indicated that clay cutans surrounding the sand grains were probably causing the low resistivity rather than high water saturation. Despite a short flow period and a short shut-in period, an estimate of permeability-thickness could be obtained from the buildup test in the Cotton Valley completion. However, because only a small portion of the perforations appeared to be open, the exact intervals that were producing and the corresponding net gas pay could not be identified. Fracture length was estimated from fracture-design models and simulation of the post-fracture production of the well. These results are discussed in detail in the report.

47175 **(PB—87-218905/XAB) Development of petrophysical techniques for evaluating tight-gas sands. Annual technical report, March 1986-February 1987.** Howard, W.E.; Hunt, E.R. (ResTech Houston, Inc., TX (USA)). Mar 1987. 136p. NTIS, PC A07/MF A01.

See also PB—86-222833.

Formation-evaluation techniques based on the integration of wireline logging surveys and core analysis were developed to establish volumetrics and mechanical properties of potential hydrocarbon-bearing reservoirs in the Travis Peak-Hosston formation of northeast Texas and north Louisiana. Objectives of the program include the establishment of a disc-stored data base of wireline logs, core-analysis data, and measured stress-test data; the quantitative evaluation of all wells in the data base for petrophysical properties utilizing methodologies learned during the study; the identification of zones of naturally high in-situ permeability; and the determination of mechanical properties of the rock and surrounding formations for massive hydraulic design. Results of these efforts were documented and compare favorably with production and core data.

Two different methods identified for porosity analysis. An algebraic model based on the simultaneous solution of four different equations has been used to describe lithology. Comparisons of the dual-water model and Waxman-Smits method indicate general agreement in the higher-porosity sands. A relationship between fracture closure pressure and acoustic log response has been identified. All of these efforts have resulted in an Integrated Log Analysis System capable of providing the user with detailed information on the prediction of gas-productive intervals and the mechanical properties necessary to optimally stimulate these reservoirs.

0310 Legislation And Regulation

REFER ALSO TO CITATION(S) 47162

0320 Transport, Pipelines, And Handling

47176 **(PB—87-209979/XAB) Technology survey for a robot which will investigate the condition of underground pipe. Topical report, June-September 1986.** Firey, B.; Zinsmeyer, C.; Coose, J.P. (BDM Corp., Austin, TX (USA)). 22 Sep 1986. 186p. NTIS, PC A09/MF A01.

The feasibility of a robotic device to operate within underground gas distribution pipe systems and investigate the condition of the pipe is considered. The device is defined to consist of seven subsystems: locomotion, steering and articulation, power, navigation, inspection, communication, and control. Existing and emerging technologies appropriate to each of the subsystems are surveyed and candidate technologies showing promise of achieving the necessary functionality, subject to the constraints, resulting from the operating environment, are identified. The robot is found to present major challenges in robotic control, miniaturized packaging, and autonomous navigation: it appears that these difficulties are surmountable with present-day technology. Several technological areas are identified in which future developments should be monitored, since progress is expected that could improve the projected performance of the inspection device.

0330 Properties

47177 **(PB—87-218137/XAB) Thermophysical properties of fluids for the gas industry. Annual report, January-December 1986.** Haynes, W.M.; Olien, N.A. (National Bureau of Standards, Boulder, CO (USA). Thermophysics Div.). Feb 1987. 321p. NTIS, PC A14/MF A01.

See also report for 1985, PB—86-203361.

Work carried out in the Fluid Properties Group, Thermophysics Division, National Bureau of Standards, Boulder, supported by the Gas Research Institute is reported. Results obtained in the calendar year 1986 are outlined. The most important are: constant-volume heat-capacity data for methane + ethane mixtures; fugacity data on hydrogen + ethane mixtures; sound-speed data for binary mixtures of methane + ethane, nitrogen + methane, and methane + carbon dioxide; and theoretical studies of sound-speed modeling, of extended corresponding states, of mixing rules, and of mean-density approximation for molecules that differ greatly in size. The overall philosophy and technical resources of the group are discussed. Plans for calendar year 1987 are also presented.

0340 Combustion

REFER ALSO TO CITATION(S) 47348, 47353, 47700, 47710

47178 **(PB—87-209599/XAB) Laser probes of natural gas ignition chemistry. Final report, January 1984-December 1986.** Crosley, D.R. (SRI International, Menlo Park, CA (USA)). Jan 1987. 138p. (SRI-MP—87-049). NTIS, PC A07/MF A01.

See also Annual Report for 1985, PB—86-201647.

The research described is aimed at developing laser-induced fluorescence of various hydrocarbon species for use as probes in natural gas combustion research, and developing an understanding of the mechanisms of ignition and the formation of chemiluminescent emission in such flames. Measurements have been made of two-dimensional imaging and the relationship between ignition chemistry and chemiluminescence for the OH and CH radicals, in flames at atmospheric and reduced pressure, and in a laser-pyrolysis system. Measurements were performed on collisional quenching, energy transfer, and transition probabilities for the OH, CH, and CH_3O radicals, in flames and discharge flow systems. Transition-state-theory calculations were performed and parameters codified for bimolecular reactions important in natural gas combustion, with special emphasis on the disputed methyl-methyl recombination rate constant.

47179 **Chemical kinetic analysis of pulse combustors.** Westbrook, C.K.; Keller, J.O. (Lawrence Livermore National Lab.). pp 1202-1211 of Proceedings of the 1986 international gas research conference. Cramer, T.L. Rockville, MD; Government Institutes Inc. (1986). (CONF-860904—). Contract W-7405-ENG-48.

From International gas research conference; Toronto, Canada (8 Sep 1986).

A detailed numerical model is used to study the role of chemical kinetics in the operation of pulse combustors. The contributions of kinetic factors are show to influence the composition limits, although the existence of a rich limit in some pulse combustors under near-stoichiometric conditions is shown to be determined by mixing limitations. The effects of changes in fuel composition and dilution by inert additives including carbon dioxide and molecular nitrogen on the operation of the pulse combustor are interpreted through their influence on the kinetics of the reignition process.

0350 Storage

REFER ALSO TO CITATION(S) 47557, 47561

47180 **(PB—87-209581/XAB) Analysis of crack propagation and arrest in welded LNG (liquefied natural gas) storage tanks. Final report, March 1984-October 1986.** Kanninen, M.F.; Dexter, R.J.; Polch, E.Z.; Popelar, C.H. (Southwest Research Inst., San Antonio, TX (USA). Engineering and Materials Science Div.). 31 Dec 1986. 153p. NTIS, PC A08/MF A01.

The extensive safe-operating experience that has been accumulated in LNG storage tanks is strongly indicative of a high degree of structural integrity. Nevertheless, concern has arisen with regard to the presence of weld-induced fabrication flaws in these tanks. When such flaws exist, it may not be possible to preclude the initiation of unstable crack growth during operation. However, if it can be shown that the material has the ability to arrest a running crack, an adequate margin of safety can still be demonstrated. A comprehensive program of experimentation was undertaken in companion programs to develop the crack-arrest properties that are needed for such a demonstration. But, because the 9% nickel steel used for LNG tank materials is very ductile and tough, its fracture properties are not well characterized by the quasi-static linear elastic-fracture-mechanics techniques available to these researchers. The research was therefore aimed at assisting the experimental work by providing more-realistic dynamic and nonlinear fracture-mechanics analyses. These analyses were intended to enhance the experimental program and to help insure that the results of the research are appropriate for the assessment of LNG storage-tank integrity. Specifically, the application of these advanced analysis techniques has demonstrated the mildly anticonservative nature of conventional fracture-mechanics treatments for the materials and structural geometry of interest. Nevertheless, provided a defected region in a storage tank is not overly large, the tank materials examined in this research possess high-enough-crack arrest toughness values to preclude complete tank rupture.

47181 **(SV-UL-FUD-B—1986-16) Model experiments on gas storage in rock caverns.** Hemstroem, B.; Karlsson, R. (Swedish State Power Board, Aelvkarleby). 7 Nov 1986. 40p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753119.

The rock cavern was simulated using a thin circular porous disc with a central hole. Pressure, flow and flowpatterns were reg-

istered. The experiments were aimed at finding any instabilities (fingering) at the gas/water surface when the gas is forcing its way into the rock, and to study if the gas could be kept inside the store by means of a water curtain. (L.E.).

04 OIL SHALES AND TAR SANDS

0401 Reserves And Exploration

REFER ALSO TO CITATION(S) 47187

0404 Oil Production, Recovery, And Refining

REFER ALSO TO CITATION(S) 47188, 47189, 47190, 47191

47182 **(DOE/FE/60177—2421) Preliminary evaluation of chemical indicators for the analysis of production losses from tar sand recovery.** Guffey, F.D.; Cummings, R.E. (Western Research Inst., Laramie, WY (USA)). Mar 1986. Contract FC21-83FE60177. 32p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000054.

This report presents the results of a preliminary investigation to evaluate changes in the chemical composition of thermally altered tar sand bitumen. The objective of the study was to determine if changes in the chemical composition of the tar sand bitumen can be correlated to chemically related production losses or thermal history of the bitumen. Tar sand samples from the Tar Sand Triangle deposit in southeastern Utah were thermally altered under autogenous conditions at temperatures of 380°C, 400°C, and 420°C for time periods ranging from 1 to 24 hours. The thermally altered tar sands was serially extracted with normal heptane, toluene, and pyridine. The normal heptane extracts from each thermal alteration experiment were analyzed by combined gas chromatography/mass spectrometery (GC/MS) to determine the presence of several classes of compounds. The heptane fractions from the thermally altered tar sand represent a complex mixture that can not be evaluated using conventional combined GC/MS techniques. For this reason, the presence of the different classes of compounds was determined by profiling ions selected to represent each class of targeted compounds. The classes of compounds targeted for this analysis included normal alkanes, tricyclic diterpanes, pentacyclic triterpanes, and aromatic species having general empirical formulas ranging from C/sub n/H/sub 2n-6/ through C/sub n/H/sub 2n-40/. The results of this investigation indicate that the pentacyclic triterpanes are the only class of compounds that follow a trend with the thermal alteration conditions. The relative intensity of the pentacyclic triterpanes decreases with increasing exposure time for each temperature investigated. This class of compounds may be useful for tracing the thermal history of tar sand bitumen in a process. 12 refs., 2 figs., 17 tabs.

47183 **(DOE/FE/60177—2430) Review of oil shale comminution technology.** McKay, J.F. (Western Research Inst., Laramie, WY (USA)). Aug 1987. Contract FC21-83FE60177. 36p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000290.

The objectives of this study were: (1) to survey the literature on the comminution requirements for flash pyrolysis and beneficiated shale conversion processes to convert oil shales to salable products; and (2) to determine from existing studies the cost of comminution as a process step in shale oil production. The study was conducted in three steps. First, particle size requirements of commercial and some bench-scale oil shale retorting processes were surveyed and tabulated. Approximately a dozen processes were identified which require shale particles of 1/2 in. or less. Most required shale particles ranging from 1/4 in. to finely ground material. Second, a literature review of developments in beneficiation and comminution technology since 1979 was conducted. The review indicated that commercial-scale comminution technology is currently available to reduce oil shales to 10- or 20-μm-size particles. Beneficiation technology is in the experimental stage of development. Third, costs of beneficiation and comminution processes were obtained from published information and from personal contacts with companies through telephone interviews. In general, comminution costs (grinding energies) were between 25 and 50 kilowatt-hours per ton to reduce crushed oil shale to 20-μm particle size. In some shale oil recovery processes, reduction to very fine particle sizes was necessary and resulted in increased oil yields that offset the cost of comminution. In other cases, reduction to fine particle sizes was impractical and did not result in improved economics when compared with conventional retorting processes. The study indicated that precise cost information is generally lacking in the literature and can be obtained only through contract agreements with private companies. 65 refs., 1 tab.

0405 Properties And Composition

REFER ALSO TO CITATION(S) 47182

47184 **(PB—87-208732/XAB) Review of needs for thermophysical property data on solid feedstocks. 2. Oil shale.** Callanan, J.E. (National Bureau of Standards, Boulder, CO (USA). Chemical Engineering Science Div.). Apr 1987. 62p. (NBSIR—87/3064). NTIS, PC A04/MF A01.

See also PB—82-241415.

This report, a comprehensive survey concerning oil shale, is the second in a series dealing with needs, particularly for thermophysical properties, for solid fuels/feedstocks. The survey shows the need for experimental work on heat of combustion, heat of retorting, heat capacity/enthalpy, thermal conductivity, thermal expansion, and heat of immersion for raw, spent and burnt shale, for kerogen, and for the mineral matter found in shale. These studies should be preceded by agreement on the properties necessary for good characterization of the shale and on the methods of measuring these properties; the thermal properties measurements should be made on well-characterized samples. Standardized measurement techniques do not exist for thermal properties, with the possible exception of heat of combustion, and must be developed. Existing data must be evaluated and reliable data generated. Theoretical studies that will allow for modeling of thermal properties should proceed along with the experimental investigations to improve the ability to predict shale properties for process design. Recommendations for work appropriate to the National Bureau of Standards are included.

47185 **(PB—87-216453/XAB) Methane contents of oil shale from the Piceance Basin, Colorado. Report of investigations/1987.** Schatzel, S.J.; Hyman, D.M.; Sainato, A.; LaScola, J.C. (Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center). 1987. 40p. (BM-RI—9063). NTIS, PC A03/MF A01.

Library of Congress catalog card no. 86-600128.

The Bureau of Mines determined the gas contents of 135 oil-shale samples obtained from approximately 630 ft of core drilling. Drilling was done within a projected mining zone of the Cathedral Bluffs Mine, located in the Piceance Basin of western Colorado. Methane contents were determined by the modified direct method, which can measure the volumes of several gases released from or reacted with mine rock without destructive sample treatment. Over the duration of the test, nitrogen was largely unreactive, CO_2 increased slightly, oxygen decreased markedly, and methane increased more than the total increase of all contained gases.

47186 **Tandem mass spectrometric analyses of geoporphyrins isolated from oil shale kerogen.** Quirke, J.M.E.; Beato, B.; Yost, R.A.; Van Berkel, G.; Filby, R.H. (Florida International Univ., Miami). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—).

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

Recently there have been many major developments in elucidating the nature of porphyrins in solvent-extractable sedimentary matter, but there is very little known about the nature of the porphyrins in kerogen. In this paper, the tandem mass spectrometric analyses of geoporphyrin mixtures isolated from kerogen by sequential pyrolyses in toluene (from 110° to 450°C) will be presented. The daughter ions of selected molecular ions from each pyrolysate, and the bitumen initially extracted from the shale, prior to de-

mineralization, will be compared. The significance of the data will be discussed in terms of the origin of the porphyrins in kerogen and how they affect the composition of bituminous geoporphyrin mixtures on release from the kerogen.

0408 Marketing And Economics

47187 **(EGG-J—03487) Developments in oil shale in 1986.** Knutson, C.F.; Dana, G.F.; Solti, G.; Hutton, A.C.; Russell, P.L.; Macanley, G.; Piper, E.M. (EG and G Idaho, Inc., Idaho Falls (USA); Magyar Allami Foeldtani Intezet, Budapest; Woolongong Univ. (Australia); Stone and Webster Engineering Corp., Denver, CO (USA)). [1987]. Contract AC07-76ID01570. 39p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014879.

Oil shale project development continued at a slow pace in the USA. The Unocal project in the Piceance Basin, Colorado achieved projection at the 4000 to 5000 bbl/day (639 to 795 m^3/day) rate. Production and project development continued in the USSR, Central, Europe, the Circum - Mediterranean area and in Australia. 17 refs., 5 figs., 3 tabs.

0409 Waste Research And Management

47188 **(DOE/FE/60177—2420) Proposed water treatment approach for commercial tar sand wastewaters.** Kocornik, D. (Western Research Inst., Laramie, WY (USA)). Sep 1986. Contract FC21-83FE60177. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013719.

Waters produced during the steamflood extraction of bitumen from tar sand require treatment before they can be recycled as feedwater for steam generation. The characterization of two waters from commercial-scale tar sand operations indicates that the levels of hardness, oil and grease, silica, suspended solids, and iron must be reduced before these waters can be reused in the bitumen extraction process. The Western Research Institute proposes two treatment methods (electrocoagulation and ultrafiltration) that may, when used in conjunction with standard practices, improve the efficiency of the overall treatment process. 21 refs., 3 tabs.

47189 **(DOE/FE/60177—2424) Wet-air oxidation of TS-1S wastewater.** Biezugbe, G.B.O.; Place, B.G. (Western Research Inst., Laramie, WY (USA)). Sep 1985. Contract FC21-83FE60177. 18p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000141.

Tar sand wastewater has been treated using a bench-scale wet air oxidation process. The wastewater, designated TS-1S, was generated during in situ recovery of bitumen from Utah tar sand. After wet-air oxidation at 485°F (252°C) in the presence of air, the chemical oxygen demand (COD), total organic carbon (TOC), and total suspended solids (TSS) of the wastewater were reduced from 12,800, 3200, and 3860 mg/L to 285, 104, and 2 mg/L, respectively. Smaller reductions in COD, TOC, and TSS were achieved when the wastewater was wet oxidized at 422°F (217°C) and 466°F (230°C). The quantity of oxygen charged into the wet-air oxidation reactor was in excess of the amount required for oxidation and hence did not limit the rate of oxidation. The wet-air oxidation system recently developed at WRI was demonstrated to be effective in the destruction of organics at high temperatures and pressures. However, the equipment has limitations for kinetic studies of a low heating rate. A gas leak also occurred around the reactor packing seal. It is recommended that a complete thermal analysis of the reactor be made to identify modifications that will result in efficient heating of the reactor vessel. Improved temperature control will enhance the investigation of wastewater oxidation kinetics. 8 refs., 6 figs., 2 tabs.

47190 **(DOE/FE/60177—2426) Organic solute profile of water from two commercial tar sand processes.** Poulson, R.E.; Clark, J.A. (Western Research Inst., Laramie, WY (USA)). Feb 1986. Contract FC21-83FE60177. 21p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000293.

By-product waters from two commercial steam flood tar sand bitumen recovery operations were screened for organic solutes by a variety of techniques. Analyses indicated that the total dissolved organic carbon content of these waters was around 100 ppm. These waters were screened using reversed-phase high performance liquid chromatography and capillary-column gas chromatography, each used with specialized detectors. The liquid chromatographic detectors were ultraviolet absorbance at 205 nm and fluorescence after a post-column reaction system using cerate oxidation. For gas chromatography, detectors were the flame ionization detector, the thermionic ionization detector, and the electron capture detector (after p-bromophenacyl bromide derivatization). The absence of low-molecular-weight hydrophilic organic species in appreciable concentrations and the evidence of high-molecular-weight organophilic solutes indicate that the hydrophilic organic carbon content is primarily humic or bituminous materials. The deficit in the inorganic cation balance indicates that some of the hydrophilic organic solutes may be catonic at pH 7. In general, those methods that have been found readily applicable for gas combustion-process by-product waters need to be expanded for nonpyrolytically produced process waters. Separation and detection of materials with poor ultraviolet absorbance at very low levels is a fertile area for research. The fundamental material balance methods upon which much of the inference of this work rests are always suspect in highly salt-loaded waters such as these. The validity under the conditions imposed by these waters needs to be demonstrated. 6 refs., 5 figs., 1 tab.

47191 **(DOE/FE/60177—2429) Characterization of Rio Blanco retort 1 water following treatment by lime-soda softening and reverse osmosis; Residual brine treated by wet-air oxidation.** Kocornik, D.; Renk, R. (Western Research Inst., Laramie, WY (USA)). Sep 1986. Contract FC21-83FE60177. 36p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000289.

Laboratory research has been conducted to evaluate the chemical, physical, and toxicological characteristics of treated and untreated water pumped from the flooded modified in situ retort at lease tract C-a. This wastewater had a total dissolved solids (TDS) content of about 5450 mg/L and a total organic carbon content of about 16 mg/L. Wet chemical analyses, metals analyses, particle-size analyses, and MICROTOX assays were performed on the wastewater before and after treatment by lime-soda softening and reverse osmosis. The reverse osmosis membrane used in this research was a Filmtec model SW30-2521 spiral-wound polyamide unit. In a short duration test at a TDS of 21,800 mg/L, the reverse osmosis system successfully removed dissolved solids and organics from the wastewater. The water was also much less toxic to the MICROTOX organism after treatment by reverse osmosis. Membrane fouling was observed when water with a TDS of 54,500 mg/L was treated. Treatment of the reverse osmosis residual brine was attempted by subcritical wet-air oxidation. The brine remaining after the 170-hour test on the water with a TDS of 5450 mg/L was subjected to temperatures ranging from 204°C (400°F) to 315°C (600°F) and pressures from 500 to 1600 psig for approximately 30 minutes. The waste treated by the higher temperatures and pressures showed good removals of organics, nitrogen compounds, and some metals. The sample treated at 302°C (575°F) and 1300 psi was assayed for MICROTOX response and no toxicity was measured. The reverse osmosis brine was significantly toxic to the MICROTOX organism before treatment by subcritical wet-air oxidation. 14 refs., 8 figs., 14 tabs.

05 NUCLEAR FUELS

0501 Reserves, Exploration, And Mining

REFER ALSO TO CITATION(S) 48033

47192 **Construction methods and materials of archaeological mounds: implications for uranium tailings impoundments.** Walters, W.H. (Pacific Northwest Lab., Richland, WA). *Nuclear Safety;* **28**: No. 2, 212-220(Apr-Jun 1987).

One aspect of long-term protection of uranium tailings impoundments concerns the ability of a large earthen structure to resist destruction from natural forces for time periods of up to 1000 years. Evidence in archaeological records suggests that man-made

earthen mounds can remain sound and intact for comparable time periods. Specific examples of man-made earthen and rock mounds exist throughout the world. Archaeological records identify the types of building materials, construction techniques, and factors that contribute to the survival of these mounds.

0504 Feed Processing

47193 **(PB—87-206587/XAB) Health-Hazard Evaluation Report HETA 85-111-1770, Feed Materials Production Center, Fernald, Ohio.** Smith, J.M.; Moss, C.E.; Flesch, J.P. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Jan 1987. 31p. (HETA—85-111-1770). NTIS, PC A03/MF A01.

In response to a request by the Director of Health, State of Ohio, a hazard evaluation was made at the Feed Materials Production Center, Fernald, Ohio to explore possible worker exposure to uranium (U) releases. During an accident, approximately 270 to 370 pounds of uranium oxide had been released. All potentially exposed workers underwent an assay by a whole-body counting system to determine the body content of uranium. All workers had a lung burden of uranium less than the maximum permissible level. Four workers were also examined by an in-vivo monitoring system to verify the results obtained with the other method. The values for U 235 found by the in-vivo method were higher by a factor of 2 to 20 over those reported by the whole-body counting system. The authors conclude that the uranium releases did not result in excessive body uranium content. The authors recommend that the Center use a permanent in-vivo assay facility for frequent, accurate monitoring of possible worker exposures to radionuclides. Lung counting should be performed semiannually for a period of several years. More radiation-safety measures should be taught to the employees. A reevaluation should be made of the need for respiratory protection for machinists who machine uranium ingots.

0505 Uranium Enrichment

47194 **(KY/L—1456) Application of fixed bed trapping technology for the removal of low concentration UF_6 from plant gaseous effluent streams.** Russell, R.G. (Paducah Gaseous Diffusion Plant, KY (USA)). 1987. Contract AC05-84OU21400. 18p. (CONF-871075—1-Vugraphs). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014092.

From 3. Oak Ridge model conference on waste problems; Oak Ridge, TN, USA (13 Oct 1987).

For the trapping of UF_6 in nitrogen, NaF > Al_2O_3 > $CaSO_4$. UF_6 inlet concentration has little effect on loading of alumina. Velocity shows an effect on UF_6 loading on alumina, with higher loading at low velocity. There is no significant difference in UF_6 loading between alumina 201A and 202HF. UF_6 outlet concentrations prior to breakthrough were measured to be as low as <1 ppB. Higher uranium loading occurs with Al_2O_3 until breakthrough (6.6% vs 5.3%), after which NaF experiences more loading (7.5% vs 11.5% at 1 ppM in the outlet). Higher trap loadings at lower pressures for both NaF and Al_2O_3. Al_2O_3 was more efficient than NaF at higher velocities.

47195 **(POEF-T—3456) Fairchild 7B compressor model.** Foster, R.E.; Neely, R.S. (Martin Marietta Energy Systems, Inc., Portsmouth, OH (USA). Quality and Technical Services Div.). 29 Jun 1987. Contract AC05-76OR00001. 6p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014827.

The Fairchild 7B centrifugal compressor used in the X-326 isotopic "top" cascade at the Portsmouth Gaseous Diffusion Plant has been modeled using a proprietary computer code called COMPAL by Concepts E.T.I., Inc. of Norwich, VT. The 7B compressor is described and some results of the modeling calculations are presented. Performance characteristics curves (PR/sub b/vs. flow and PR/sub a/) are included for UF_6 gas for two compressor inlet temperatures.

0508 Spent Fuels Reprocessing

REFER ALSO TO CITATION(S) 47234, 47235

47196 **(DP-MS—87-65) Canyon solvent cleaning with activated alumina.** Reif, D.J. (Savannah River Lab., Aiken, SC (USA)). 1987. Contract AC09-76SR00001. 6p. (CONF-871101—43). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87012383.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

Uranium fuels containing ^{235}U are processed and recovered, along with neptunium and plutonium byproducts, at the Savannah River Plant (SRP). Recently, the ^{95}Zr and ^{106}Ru levels in the product exceeded product specifications, requiring the product to be recycled through the second cycle purification process. Laboratory studies indicated that poor solvent quality was partially responsible for poor first cycle decontamination from these fission products. Two approaches were followed to improve the quality of first cycle solvent. First, an increase in carbonate wash contact time was examined. An adsorption cleaning process was examined as an alternative method to restore solvent quality. This paper discusses the laboratory work leading to a new SRP cleaning process and the scale-up of the process to clean the 16,500-gallon first cycle solvent inventory.

47197 **Determination of uranium in solution using laser-induced breakdown spectroscopy.** Wachter, J.R.; Cremers, D.A. (New Technology and Engineering Division (J.R.W.) and Chemical and Laser Sciences Division (D.A.C.), Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Applied Spectroscopy;* **41**: No. 6, 1042-1047(Aug 1987).

Laser-induced breakdown spectroscopy was used to determine uranium in solution for possible application to process control in nuclear fuel reprocessing facilites. Pulses from a Nd:YAG laser were focused on the surfaces of the liquids in order to generate the sparks. The spark light was spectrally resolved and detected with the use of a time-gated photodiode array. The detection limit for uranium in 4 molar nitric acid was 0.1 g/L. Measurement precisions were 1—2% for a 4.2-g/L solution with the use of 1600 laser sparks, corresponding to a measurement time of about three minutes. A calibration curve was prepared that spanned uranium concentrations from 0.1 to 300 g/L. The effects of some experimental parameters on the analysis are discussed.

0509 Transport And Storage

47198 **(CONF-871101—32) KENO V.a validation of fuel pin experiments.** Dyer, H.R.; Westfall, R.M. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 7p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87011672.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

This paper describes the results of computations performed on a set of critical experiments designed to simulate high-density storage of reactor fuel pins. The purpose of these computations is to validate the Monte Carlo criticality code KENO V.a with the four cross-section libraries provided with the SCALE modular code system. The principal conclusion drawn from this study is the satisfactory performance of the SCALE cross-section libraries in the analysis of systems containing consolidated light-water reactor fuel. As observed in previous studies, the ENDF/B-IV-based libraries undercalculate the effective neutron multiplication factor (k/sub eff/) by 1 to 2% k, depending on the degree of neutron moderation. 5 refs., 2 tabs.

47199 **(CONF-871101—48) Projected Standard on neutron skyshine.** Westfall, R.M.; Williams, D.S. (Oak Ridge National Lab., TN (USA); Bechtel North American Power Corp., Gaithersburg, MD (USA)). Jul 1987. Contract AC05-84OR21400. 5p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87012935.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

Current interest in neutron skyshine arises from the application of dry fuel handling and storage techniques at reactor sites, at the proposed monitored retrievable storage facility and at other facilities being considered as part of the civilian radioactive waste management programs. The chairman of Standards Subcommittee ANS-6, Radiation Protection and Shielding, has requested that a work group be formed to characterize the neutron skyshine problem and, if necessary, prepare a draft Standard. The work group is comprised of representatives of storage cask vendors, architect engineering firms, nuclear utilities, the academic community and staff members of national laboratories and government agencies. The purpose of this presentation summary is to describe the activities of the work group and the scope and contents of the projected Standard, ANS-6.6.2, "Calculation and Measurement of Direct and Scattered Neutron Radiation from Nuclear Power Operations." The specific source under consideration by the work group is an array of dry fuel casks located at a reactor site. However, it is recognized that the scope of the standard should be broad enough to encompass other neutron sources. The Standard will define appropriate methodology for properly characterizing the neutron dose due to skyshine. This dose characterization is necessary, for example, in demonstrating compliance with pertinent regulatory criteria.

47200 (EPRI-NP—4902-SR, pp 20.1-20.13) **Ultrasonic determination of module form, size, and distribution in ductile cast iron.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The purpose of this program is to support the Electric Power Research Institute (EPRI) in developing a qualification program for nodular cast iron as an economical material for the fabrication of dual-purpose storage/transport containers for nuclear spent fuel. The ductility of nodular cast iron is directly linked to the form, size, and distribution of graphite and the purity of the ferritic microstructure. Therefore, an integral part of the qualification program is to develop a reliable nondestructive test method for measuring these parameters. An extensive literature search was done to assist in developing the technical basis for laboratory measurements. The most relevant works are shown in the bibliography of this report. EPRI supplied various nodular cast iron specimens from different manufacturers. Samples were made from these specimens and evaluated in the laboratory using pulse-echo ultrasonic techniques. The measurements included bulk velocity, attenuation, and frequency spectrum. Preliminary experimental results show that the diameter of scattering centers can be estimated by measuring material attenuation versus frequency in the range from 7 to 12 MHz. Factors contributing to the precision of these measurements were identified. Improved precision is expected using frequencies above 12 MHz. Specimen coupons were marked, prepared, and sent to an independent laboratory for comprehensive metallographic analyses. Additional tasks in this program included supporting EPRI and ASTM in developing an industry specification for nuclear spent fuel transport containers fabricated with ductile cast iron. This consisted of preparing the first draft of a supplemental NDT procedure, attending and presenting a report at a committee meeting, and writing a technical note for distribution to ASTM committee members.

47201 **(PNL—6201) Interim results from UO_2 fuel oxidation tests in air.** Campbell, T.K.; Gilbert, E.R.; Thornhill, C.K.; White, G.D.; Piepel, G.F.; Griffin, C.W.j. (Pacific Northwest Lab., Richland, WA (USA)). Aug 1987. Contract AC06-76RL01830. 147p. NTIS, PC A07/MF A01; 1; GPO Dep. File Number DE88000250.

An experimental program is being conducted at Pacific Northwest Laboratory (PNL) to extend the characterization of spent fuel oxidation in air. To characterize oxidation behavior of irradiated UO_2, fuel oxidation tests were performed on declad light-water reactor spent fuel and nonirradiated UO_2 pellets in the temperature range of 135 to 250°C. These tests were designed to determine the important independent variables that might affect spent fuel oxidation behavior. The data from this program, when combined with the test results from other programs, will be used to develop recommended spent fuel dry-storage temperature limits in air. This report describes interim test results. The initial PNL investigations of nonirradiated and spent fuels identified the important testing variables as temperature, fuel burnup, radiolysis of the air, fuel microstructure, and moisture in the air. Based on these initial results, a more extensive statistically designed test matrix was developed to study the effects of temperature, burnup, and moisture on the oxidation behavior of spent fuel. Oxidation tests were initiated using both boiling-water reactor and pressurized-water reactor fuels from several different reactors with burnups from 8 to 34 GWd/MTU. A 10^5 R/h gamma field was applied to the test ovens to simulate dry storage cask conditions. Nonirradiated fuel was included as a control. This report describes experimental results from the initial tests on both the spent and nonirradiated fuels and results to date on the tests in a 10^5 R/h gamma field. 33 refs., 51 figs., 6 tabs.

47202 **(PNL—6322) 1987 Federal interim storage fee study: A technical and economic analysis.** (Johnson (E.R.) Associates, Inc., Reston, VA (USA); Zsonics, Inc., Van Nuys, CA (USA). Environmental Systems Div.). Sep 1987. Contract AC06-76RL01830. 154p. NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE88000270.

This document is the latest in a series of reports that are published annually by Pacific Northwest Laboratory (PNL) for the US Department of Energy (DOE). This information in the report, which was prepared by E.R. Johnson Associates under subcontract to PNL, will be used by the DOE to establish a payment schedule for interim storage of spent nuclear fuel under the Federal Interim Storage (FIS) Program, which was mandated by the Nuclear Waste Policy Act of 1982. The information in this report will be used to establish the schedule of charges for FIS services for the year commencing January 1, 1988. 13 tabs.

47203 **(SAND—87-0089C) Spent fuel transportation system limitations and opportunities.** Stiegler, J.E.; Allen, G.C. Jr.; Cashwell, J.W. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 17p. (CONF-870948—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014895.

From American Nuclear Society topical meeting on the integrated spent fuel and HLW management system; Albuquerque, NM, USA (27 Sep 1987).

This paper presents an overview of spent fuel transportation in the United States from a current as well as historical perspective and discusses the planned activities in this area being developed under the sponsorship of the US Department of Energy's (DOE) Office of Civilian Radioactive Waste Management (OCRWM). The current transportation situation existing truck and rail size and weight limitations and current reactor interfaces with the transportation system are discussed, and summary of the projected shipment estimates for spent fuel is included. The sensitivity of shipment estimates to important transport parameters (such as individual cask capacity) and possible improvements and opportunities in transportation are presented. It reviews a variety of potential options for improving the safety and life cycle cost of future spent nuclear fuel shipments. Many of these options are being implemented or being evaluated for future implementation by participants in the Department of Energy's civilian waste transportation program. The options for improvements and opportunities are discussed in five categorical areas: (1) the cask and transporter hardware, (2) shipment operations, (3) the reactor interface, (4) the MRS/repository interface, and (5) safety verification methods. The ideas presented are a sampling and are not meant to be an exhaustive listing. 15 refs., 4 figs., 7 tabs.

47204 **(SAND—87-0151) Feasibility and incentives for the consideration of spent fuel operating histories in the criticality analysis of spent fuel shipping casks.** Sanders, T.L.; Westfall, R.M.; Jones, R.H. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1987. 240p. (TTC—0713). NTIS, PC A11/MF A01. File Number DE88000110.

Analyses have been completed that indicate the consideration of spent fuel histories ("burnup credit") in the design of spent fuel shipping casks is a justifiable concept that would result in cost savings and public risk benefits in the transport of spent nuclear fuel. Since cask capacities could be increased over those of casks without burnup credit, the number of shipments necessary to transport a given amount of fuel could be reduced. Reducing the number of shipments would increase safety benefits by reducing public and occupational exposure to both radiological and nonradiological risks associated with the transport of spent fuel. Economic benefits would include lower in-transit shipping, reduced transportation fleet capital costs, and reduced numbers of cask handling operations at both shipping and receiving facilities. 44 refs., 66 figs., 28 tabs.

0520 Waste Management

REFER ALSO TO CITATION(S) 47467, 47581, 47595, 47901, 47933, 47936, 48033, 48404

47205 **(AD-A—182138/8/XAB) Atmosphere-assisted machining of depleted-uranium (DU) penetrators. Final report.** Latham-Brown, C.E.; Porter, F.R.; Vanderkooi, D. (Nuclear Metals, Inc., Concord, MA (USA)). May 1987. 51p. NTIS, PC A04/MF A01.

The work described details a method that permits the machining of depleted-uranium penetrators under a protective atmosphere. The quality of the DU chips produced under these conditions was such that remelting under specific conditions resulted in high recovery yields of material normally considered scrap. The potential for cost reduction is advanced by this approach.

47206 **(AD-A—182628/8/XAB) Established techniques for cleaning depleted-uranium derby in lieu of nitric acid pickling. Contractor report (Final).** Letham-Brown, C.E.; Vanderkooi, D. (Nuclear Metals, Inc., Concord, MA (USA)). May 1987. 46p. NTIS, PC A03/MF A01.

The work described in this report details a method for the surface cleaning of depleted uranium derby by means of high-pressure water in lieu of nitric acid. The benefits realized are a more thorough cleaning, no loss of metal by pickling, elimination of hazardous handling, and disposal of spent-acid solutions.

47207 **(BMI/ONWI—644) Draft Underground Test Plan for site characterization and testing in an exploratory shaft facility in salt.** (Golder Associates, Inc., Lakewood, CO (USA); Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). May 1987. Contract AC02-83CH10140. 659p. NTIS, PC A99. File Number DE87012946.

An exploratory shaft facility (ESF) at the Deaf Smith County, Texas is a potential candidate repository site in salt. This program of underground testing constitutes part of the effort to determine site suitability, provide data for repository design and performance assessment, and prepare licensing documentation. This program was developed by defining the information needs, as derived from the governing regulatory requirements and associated performance issues; evaluating the efficacy of available tests in satisfying the information needs; and selecting the suite of underground tests that are most cost-effective and timely, considering the other surface-based, surface borehole, and laboratory test programs. Tests are described conceptually, categorized in terms of geology, geomechanics, thermomechanics, geohydrology, or geochemistry, and range in scope from site characterization to site/engineered system interactions. The testing involves construction testing, conducted in the shafts during construction, and in situ testing at depth, conducted in the shafts and in the at-depth test facility at the repository horizon after shaft connection. 41 refs., 67 figs., 16 tabs.

47208 **(BMI/ONWI—650) Quarterly brine migration data report, January-March 1985: Nuclear waste repository simulation experiments (brine migration), Asse Mine of the Federal Republic of Germany.** Eckert, J.L.; Kalia, H.N.; Coyle, A.J. (Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). Aug 1987. Contract AC02-83CH10140. 264p. NTIS, PC A12/MF A01; 1; GPO Dep. File Number DE87013865.

The Asse brine migration tests are being performed to obtain an understanding of the brine migration mechanism, to obtain data for supporting numerical models, to determine the chemical composition of the brine produced, and to determine the thermomechanical behavior of the host rock. Primary objectives of the brine migration tests are to observe the migration of water in salt at the Asse Mine; qualify the test methods and equipment for obtaining brine-migration-related data that support the validity of numerical models for potential US and FRG repository sites; observe borehole conditions such as radiolysis, corrosion, gas generation, pressure, and other synergistic effects resulting from the arrival of brine water; and observe the thermomechanical behavior of salt in the presence of heat, brine, and radiation to support and refine finite-element methods of predicting room closure and other thermomechanical behaviors of salt. This report describes the test equipment, the Asse Salt Mine, and the pretest properties of the salt in the test gallery. This report also includes test data for the first 22 months of operations on brine migration rates, borehole pressure, salt temperatures, and thermomechanical behavior of the salt. 2 refs., 120 figs., 92 tabs.

47209 **(CEA-CONF—8782) Analogue studies at the French Atomic Commission (CEA).** Petit, J.C. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Inst. de Recherche Technologique et de Developpement Industriel (IRDI)). Jun 1986. 12p. (CONF-8606319—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752605.

From 2. NAWG meeting of the C.E.C.; Interlaken, Switzerland (16 Jun 1986).

The different research activities of the French Atomic Energy Commission in the analogue study field are presented. Most of them are conducted in collaboration with major research organisations, both french and international. In fact, the scientific community has been associated to these programmes at different steps of their realisation. The brief description presented illustrates the great diversity and complementarity of actions conducted by CEA for better understanding, through the study of natural analogues, the basic processes that will rule the long term behaviour of high level radwaste materials in a repository and hence contributing to hopefully guaranty disposal safety.

47210 **(DOE/ET/44802—T20) PMF (probable maximum flood) study for Nevada Nuclear Waste Storage Investigation Project.** Bullard, K.L. (Bureau of Reclamation, Denver, CO (USA). Engineering and Research Center). Jan 1986. Contract AI08-78ET44802. 600p. (GR—87-8). NTIS MF A01. File Number DE87012940.

This document estimates the risk of flooding in the high-level radioactive waste depository proposed for the Yucca Mountain of Nevada. Described are the general features of the proposed site, the drainage pattern of the surrounding area, the historical pattern of precipitation, and an estimate of future precipitation trends. Information from this report will be used in decisions on flood protection construction at this facility. 10 refs., 61 figs., 42 tabs.

47211 **(DOE/NBM—7013290) The carbonate complexation of plutonium(IV).** Hobart, D.E.; Palmer, P.D.; Newton, T.W. (Los Alamos National Lab., NM (USA)). [1985]. Contract W-7405-ENG-36. 16p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013290.

Plutonium(IV) carbonate complexes are expected to be of particular importance in typical groundwaters at the Yucca Mountain site of the candidate nuclear waste repository being studied by the Nevada Nuclear Waste Storage Investigations Project. The chemistry of these complexes is also important in the areas of nuclear fuel reprocessing and purification, actinide separations, and

environmental studies. This report describes initial experiments performed to determine the identity and equilibrium quotients of plutonium(IV) carbonate complexes. These experiments were performed at pH values between 7.2 and 9.6 using a spectrophotometric method. In addition, a brief review of the published literature on Pu(IV) carbonate complexes is presented. Since Pu(IV) exhibits low solubility in the near-neutral pH range, a complex-competition reaction where citrate ligands compete with carbonate ions for the plutonium will be employed. This will permit us to study the pure carbonate system; study the mixed carbonate/citrate system, and confirm and extend the literature work on the pure citrate system. The current experiments have demonstrated the existence of at least three distinct species in the pH region studied. This work will continue in the extended study of the pure citrate system, followed by the investigation of the citrate/carbonate complex/competition reaction. 9 refs., 4 figs., 2 tabs.

47212 **(DOE/NBM—7013291) The transport of uranium and technetium through the unsaturated tuffs, Yucca Mountain, Nevada.** Cederberg, G.A.; Greenwade, L.E.; Travis, B.J. (Los Alamos National Lab., NM (USA)). [1986]. Contract W-7405-ENG-36. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013291.

An area containing unsaturated fractured tuffs at Yucca Mountain, Nevada, is one of the potential sites for geologic storage of high-level radioactive waste. The Environmental Protection Agency (EPA) 40 CFR 191 Regulation limits the cumulative releases of many radionuclides from the repository to the accessible environment for 10,000 years after disposal. Numerical models can be used to determine if the EPA containment requirement is met. In this paper a preliminary set of transport calculations for uranium and technetium is discussed. A foundation for the calculations, a comprehensive, referenced geochemical/geophysical model containing the current stratigraphic, petrologic, hydrogeologic, geochemical, and material data for the Yucca Mountain site was compiled. The integrated transport of uranium and technetium from the repository to the water table was modeled. An expected-case flow scenario and a worse-case flow scenario were used in the calculations. The sorption of technetium was neglected in the worse-case scenario. Results show that in the case of uranium, the estimated transport was only moderately sensitive to the magnitude of the flow because sorption had a significant effect on the retardation. In the case of technetium, when sorption was neglected, the flow dominated the transport. The EPA containment requirements were met for all cases. These preliminary calculations will be used as a basis to investigate the effects of physical and geochemical processes on the long-term transport of radionuclides at Yucca Mountain. 18 refs., 4 figs., 3 tabs.

47213 **(DOE/NBM—7013292) Distribution and chemistry of diagenetic minerals at Yucca Mountain, Nye County, Nevada.** Broxton, D.E.; Bish, D.L.; Warren, R.G. (Los Alamos National Lab., NM (USA)). [1985]. Contract W-7405-ENG-36. 59p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87013292.

Yucca Mountain is being studied as a potential site in southern Nevada for an underground high-level nuclear waste repository. A major consideration for selecting this site is the presence of abundant zeolites in Miocene ash-flow tuffs underlying the region. We have studied the distribution and chemistry of diagenetic minerals at Yucca Mountain using optical petrography, x-ray powder diffraction, electron microanalysis, and x-ray fluorescence spectrometry to identify factors controlling the distribution of these minerals and to understand the diagenetic history at Yucca Mountain. Diagenetic alteration is best developed in nonwelded ash-flow tuffs and in the nonwelded tops and bottoms of welded ash-flow cooling units having crystallized interiors. These nonwelded tuffs were vitric tuffs become progressively less hydrous with depth, and four diagenetic mineral zones are recognized beneath most of Yucca Mountain. 12 refs., 12 figs., 7 tabs.

47214 **(DP-MS—87-61) The sensitivity index as a screening tooling in the uncertainty analysis of ground-water contaminant transport.** Fjeld, R.A.; Sill, B.L.; Looney, B.B. (Clemson Univ., SC (USA); Savannah River Lab., Aiken, SC (USA)). 1987. Contract AC09-76SR00001. 18p. (CONF-870971—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014437.

From Geostatistical sensitivity and uncertainty methods for groundwater flow and radionuclide transport modeling conference; San Francisco, CA, USA (15 Sep 1987).

A method is presented that incorporates features of Tomovic's sensitivity index to facilitate the time-dependent sensitivity analysis of ground-water contaminant transport in a radioactive risk assessment application. The basic approach involves specification of nominal, minimum, and maximum values of the transport parameters, calculation of contaminant concentrations corresponding to the parameter values, and, finally, calculation of the sensitivity index as a function of time. A key aspect of the method is definition of an appropriate sensitivity index. In the application presented here, an index is defined that emphasizes deviations from nominal concentrations that are significant relative to the maximum nominal concentration and de-emphasizes the uncertainties at the leading edge of the contaminant breakthrough curve, which are large on a relative basis but small on an absolute basis. The method is illustrated using a simple one-dimensional ground-water advection-dispersion model and is applied to a radioactive waste disposal site. An uncertainty analysis of the same site is performed by Monte Carlo simulation for comparison. The sensitivity index is found to be a practical, easily implemented screening tool for identifying the critical parameters, determining the time periods over which parameter uncertainty is important, and obtaining an upper bond estimate of the magnitude of the uncertainty. Precise estimates of the uncertainty can subsequently be obtained by more elegant techniques. Although the application presented here involves low-level radioactive waste, the method and general conclusions regarding the use of a sensitivity index in ground-water transport modeling might be useful in evaluating high-level or hazardous waste disposal problems as well.

47215 **(INIS-mf—10948) Collection of lectures delivered at decontamination course.** (Ceskoslovenska Vedeckotechnicka Spolecnost, Prague). 20 Aug 1986. 94p. (In Czech). (CONF-8510469—). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906.

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

The collection contains 10 lectures read at the decontamination workshop DEK '85 held between 29-31 October 1985 at the Nuclear Research Institute at Rez, all of which fall under the INIS Subject Scope. The workshop, whose first course was held in 1975, is destined for personnel of various institutions who are decontamination process users but also for designers of nuclear installations, personnel of safety of work inspectorates, hygiene services, etc. (Z.M.).

47216 (INIS-mf—10948, pp 2-7) **Methods of assessing surfaces and contaminants and efficiency measurements of decontamination procedures.** Alexa, J. (Ustav Jaderneho Vyzkumu CSKAE, Rez, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

Problems are discussed associated with the quantitative description of the decontamination process. Such an approach can bring about improvement in decontamination procedures as it allows more objective evaluation of their results, and can also contribute to their better economy. With respect to this fact, the methods of evaluation of surfaces and decontaminants and of measuring the efficiency of decontamination procedures are dealt with. It is shown that the major problem consists in the fact that no standard reproducible surface exists and thus a calibration standard to which the results of measuring the properties of surfaces can be referred is not easy to prepare. The terms, quantities and definitions permitting to describe the contamination and decontamination processes are briefly characterized. (Z.M.).

47217 (INIS-mf—10948, pp 8-18) **Decontamination of radiopharmaceuticals.** Prokop, J. (Ustav Jaderneho Vyzkumu CSKAE, Rez, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

A review is presented of radionuclides at present most frequently used in nuclear medicine. With respect to the different radioactive contamination risks, activities at nuclear medicine units are classified into four basic groups: the preparation of basic nuclides using the Tc-99m and In-113m generator systems; the preparation of labelled compounds for various types of diagnostic examinations; the dilution of radiopharmaceuticals to the required diagnostic doses and their application; radioimmunossay. The questions are discussed of relationships between the system of work and radioactive contamination. The principles are outlined of decontamination procedures for various cases of undesirable contamination due to radiopharmaceuticals. (Z.M.).

47218 (INIS-mf—10948, pp 19-27) **Skin decontamination.** Severa, J.; Knajfl, J. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

The problem matter is briefly characterized of skin damage by irradiation and of the binding of radioactive materials to the skin. The results are summed up of some experiments aimed at skin resorption of various radioactive materials. Main attention is devoted to methods of skin decontamination. The principles are described in detail of the operation of the so-called hygiene loops where complete decontamination of personnel proceeds. The organizational chart of such a unit is presented in figure. Information is also presented on the composition of solutions for skin decontamination. (Z.M.).

47219 (INIS-mf—10948, pp 28-36) **Decontamination of fabric.** Severa, J.; Knajfl, J. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

Questions are briefly discussed associated with the decontamination of fabric as the basic material for the manufacture of work clothings and garments. They mainly involve the methods of contamination (dry or wet) and the types of binding between the contaminant and the fabric. Main attention is paid to the methods of fabric decontamination, this both dry methods and especially wet methods. The methods are discussed in detail of fabric decontamination by dry cleaning using various organic solvents. Experimental results are tabulated of decontamination of fabric artificially contaminated with a solution of a fission product mix. The highest value of decontamination efficiency obtained by soaking the fabric in an organic solvent and subsequent washing is 95%. (Z.M.).

47220 (INIS-mf—10948, pp 51-72) **Use and disposal of radioisotopes in non-nuclear fields.** Dlouhy, Z. (Ustav Jaderneho Vyzkumu CSKAE, Rez, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

The problems are discussed of disposal of radioactive wastes produced as a result of the application of radionuclides in sciences, medicine and industries. The methods are listed of disposing of various types of solid wastes, and the categories are enumerated of liquid wastes according to the IAEA classification. Different disposal techniques are outlined for different applications of radionuclides in research and in nuclear medicine, i.e., virtually in laboratory conditions, and in the industries where the conditions for such activities are entirely different. Briefly discussed are also some aspects of transport, processing and burial of radioactive wastes. (Z.M.).

47221 (INIS-mf—10948, pp 73-76) **Decontamination and radioactive waste disposal at UJV.** Ruzicka, F. (Ustav Jaderneho Vyzkumu CSKAE, Rez, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

The central decontamination station is described designed for radioactive waste disposal at the Nuclear Research Institute at Rez. The station has been in operation since 1962 and it processes around 2,000 m/sup 3/ annually of radioactive waste waters of a specific activity of 10/sup 6/ to 10/sup 8/ s/sup -1/m/sup -3/. The resulting concentrate makes up for amout 12 m/sup 3/ which, following treatment represents around 24 m/sup 3/ designed for ultimate burial. Roughly 30 m/sup 3/ of solid wastes are processed annually, of which quantity about 60% are compressible wastes. (Z.M.).

47222 (INIS-mf—10948, pp 86-94) **Disposal of radioactive wastes from radioisotope workplaces.** Stopek, K.; Pinkas, V.; Safar, O.; Stanc, J. (Ustav pro Vyzkum, Vyrobu a Vyuziti Radioisotopu, Prague, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

The Institute for Research, Production and Application of Radioisotopes (UVVVR) is responsible for the disposal of radioactive wastes from all radionuclide workplaces in Czechoslovakia. Briefly described are the methods of processing radioactive wastes at the workplaces as well as some shortcomings which are found during the acceptance procedure. The transport of processed solidified wastes in 200 l steel drums is provided using a Skoda-Liaz truck of a loading capacity of 9 t. The truck is used for both the transport of wastes to the place of ultimate burial and the transport of untreated wastes to UVVVR or to UJV for further processing. Low-level liquid wastes are transported in two tankers of an useful volume of 8000 l each using a Skoda-Liaz road tractor. The burial place for wastes containing artifical radionuclides is underground limestone quarry Richard in Litomerice of a capacity of about 9,000 m/sup 3/ while the Bratrstvi shaft in Jachymov of a capacity of about 1,100 m/sup 3/ is used as the burial place for wastes with natural radionuclides. (Z.M.).

47223 (INIS-mf—10948, pp 77-85) **Designing the criteria of radioactive waste acceptability for ultimate burial.** Nachmilner, I. (Ustav Jaderneho Vyzkumu CSKAE, Rez, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

General aspects are discussed of radioactive waste disposal, including the ALARA principle application. The disposal criteria are briefly characterized. The criteria of acceptability of wastes for ultimate burial are given by parameters which the radioactive wastes must fulfil in order that the given system of burial could be declared safe. The determination of the parameters is based on IAEA publication TECDOC-285, Vienna 1983. The terms are briefly characterized used in the publication. (Z.M).

47224 (INIS-mf—10956, pp 37) **Comparative calculational test of computer codes on a radwaste-drum dose problem.** Sartori, D.E. (Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

47225 (INIS-XN—57) Interim oceanographic description of the North-East-Atlantic site for the disposal of low-level radioactive waste. Vol. 2. Dickson, R.R.; Gurbutt, P.A.; Kershaw, P.J. (eds.). (Nuclear Energy Agency, 75 - Paris (France)). 1986. 191p. NTIS (US Sales Only), PC A09/MF A01. File Number DE87703271.

Also published in French.

The NEA Co-ordinated Research and Environmental Surveillance Programme (CRESP) related to sea disposal of radioactive waste was started in 1981 following a recommendation of the Group of experts convened every five years by NEA to review the continued suitability of the dumping site for radioactive waste in the North-East Atlantic. The objective of CRESP is to increase the available scientific data base related to the oceanographic and biological characteristics of the dump site and elaborate a site specific model of the transfers of radionuclides to human populations. Volume one of the "Interim Oceanographic Description of the North-East Atlantic Site for the Disposal of Low-Level Radioactive Waste" was published in early 1983. It was an attempt to identify remaining gaps in current knowledge of conditions at the site and relate these conditions to the physical environment of the North-East Atlantic Ocean as a whole. The amount of data obtained by the CRESP Programme is now sufficient to justify publication of this second volume. Scientists present results of research which is of direct relevance to a better assessment of the impact from dumping radioactive waste in the North-East Atlantic, in particular an evaluation of the potential radiation doses to man. These two volumes represent part of the scientific contribution of the CRESP Programme to the 1985 Review of the Continued Suitability of the North-East Atlantic dump site.

47226 (NAGRA-NTB—84-33) Backfilling and sealing of tunnels, shafts and boreholes. Volume 2: Appendices. Studer, J.; Ammann, W.; Meier, P.; Mueller, Ch.; Glauser, E. (Nationale Genossenschaft fuer die Lagerung Radioaktiver Abfaelle (NAGRA), Baden (Switzerland)). Dec 1984. 230p. (In German). Nagra, CH-5401 Baden, Switzerland.

The present report is a synthesis of the state of knowledge regarding backfilling and sealing of nuclear waste repositories. It is based on an evaluation of both the general and special publications concerning this problem (articles in scientific journals, research reports, conference papers and textbooks) and represents the state of knowledge up to summer 1984. In addition, it contains an outlook on the continuing work. This will serve to broaden the scientific base and to achieve the technical as well as economical optimization. The report consists of two volumes: Volume 1, Main Part; Volume 2, Appendices. Starting with the functions of backfilling and sealing in the safety concept assessment criteria and from these, taking into consideration the given conditions in the project Gewaehr 1985 (Guarantee), the requirements for the backfilling and sealing materials are formulated. The properties of several materials under consideration are discussed in the Appendix together with a detailed description of the most important of these materials. The reasons are given for the choice of the proposed materials for the project Gewaehr 1985. Alternative backfilling and sealing concepts for repositories Type B and Type C are presented and reasons are given for the selected variants for the project Gewaehr 1985. Chapter 10 represents a review of the report. This report is intended as a reference work for the corresponding chapters in the NGB reports (cf. /NGB 85-03, 1985/, /NGB 85-06, 1985/).

47227 (NUREG/CR—4957) Survey of geophysical techniques for site characterization in basalt, salt and tuff. Jones, G.M.; Blackey, M.E.; Rice, J.E.; Murphy, V.J.; Levine, E.N.; Fisk, P.S.; Bromery, R.W. (Weston Geophysical Corp., Westboro, MA (USA); Nuclear Regulatory Commission, Washington, DC (USA). Div. of Waste Management). Jul 1987. 147p. NTIS, PC A07 - GPO. File Number TI87900979.

Geophysical techniques may help determine the nature and extent of faulting in the target areas, along with structural information that would be relevant to questions concerning the future integrity of a high-level-waste repository. Chapters focus on particular geophysical applications to four rock types - basalt, bedded salt, domal salt and tuff - characteristic of the sites originally proposed for site characterization. No one geophysical method can adequately characterize the geological structure beneath any site. The seismic reflection method, which is generally considered to be the most incisive of the geophysical techniques, has to date provided only marginal information on structure at the depth of the proposed repository at the Hanford, Washington, site, and no useful results at all at the Yucca Mountain, Nevada, site. This result is partially due to geological complexity beneath these sites, but may also be partially attributed to the use of inappropriate acquisition and processing parameters. To adequately characterize a site using geophysics, modifications will have to be made to standard techniques to emphasize structural details at the depths of interest. 137 refs., 43 figs., 4 tabs.

47228 (PB—87-205902/XAB) Deepwater demersal fishes observed from the submersible AVALON (DSRV-2) off the Farallon Islands, 24 June 1985. Technical report (Final). Gotshall, D.W.; Dyer, R.S. (California State Dept. of Fish and Game, Long Beach (USA). Marine Resources Div.). Jun 1987. 24p. (MARINE-RESOURCES-TR—55). NTIS, PC A02/MF A01.

The U.S. Navy's Deep Submergence Rescue Vehicle AVALON (DSRV-2) was used to locate low-level radioactive waste containers and make observations of deepwater benthic fishes and invertebrates at the 900 m (2952 ft) radioactive waste disposal site approximately 4.4 km SW of the Farallon Islands off San Francisco, California. During the three hours on the bottom in depths of 975 to 1039 m (3198 to 3408 ft) five identifiable species of demersal fishes were observed.

47229 (RHO-HS-SR—86-1-P) Rockwell Hanford Operations effluents and solid waste burials during calendar year 1986. Howe, D.B.; Aldrich, R.C.; Shay, R.S.; Voigt, L.J. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). Jul 1987. Contract AC06-77RL01030. 170p. NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE87012692.

The quantities of solid, liquid, or gaseous wastes buried or discharged during calendar year 1986 are monitored and reported in this document. Discharge concentrations were compared to more restrictive Rockwell administrative control values for compliance; two gaseous streams and two liquid streams exceeded Rockwell limits. 24 refs., 3 figs., 15 tabs.

47230 (SAND—86-1264) Specification of a test problem for HYDROCOIN [Hydrologic Code Intercomparison] Level 3 Case 2: Sensitivity analysis for deep disposal in partially saturated, fractured tuff. Prindle, R.W. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1987. Contract AC04-76DP00789. 37p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013974.

The international Hydrologic Code Intercomparison Project (HYDROCOIN) was formed to evaluate hydrogeologic models and computer codes and their use in performance assessment for high-level radioactive waste repositories. Three principal activities in the HYDROCOIN Project are Level 1, verification and benchmarking of hydrologic codes; Level 2, validation of hydrologic models; and Level 3, sensitivity and uncertainty analyses of the models and codes. This report presents a test case defined for the HYDROCOIN Level 3 activity to explore the feasibility of applying various sensitivity-analysis methodologies to a highly nonlinear model of isothermal, partially saturated flow through fractured tuff, and to develop modeling approaches to implement the methodologies for sensitivity analysis. These analyses involve an idealized representation of a repository sited above the water table in a layered sequence of welded and nonwelded, fractured, volcanic tuffs. The analyses suggested here include one-dimensional, steady flow; one-dimensional, nonsteady flow; and two-dimensional, steady flow. Performance measures to be used to evaluate model sensitivities are also defined; the measures are related to regulatory criteria for containment of high-level radioactive waste. 14 refs., 5 figs., 4 tabs.

47231 **(SAND—87-0630) A linear-flow interpretation of the H-3 multiwell pumping test conducted at the Waste Isolation Pilot Plant (WIPP) site.** Tomasko, D.; Jensen, A.L. (Sandia National Labs., Albuquerque, NM (USA)). Jul 1987. Contract AC04-76DP00789. 37p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013842.

Unlike previous interpretations of this test that used a double-porosity radial-flow model, this interpretation is based on a linear-flow process. Drawdowns in pumped well H-3b2 responded as if the Culebra Dolomite Member of the Rustler Formation were pumped from an elongated feature with a significantly higher permeability than the surrounding porous medium. Drawdowns in observation wells DOE-1 and H-11 exhibited nearly classic linear-flow behavior in specialty plots of drawdowns had excellent type-curve matches with a linear-flow type curve. The orientation of the linear feature using data from a multiwell interference test was found by minimizing the squared differences between field observations and linear flow calculations. A second technique was used to calculate the transmissivity and width of the feature. To calculate consistent system parameters, this technique required developing a least-squares fitting procedure to minimize the effects of noise in the drawdown measurements. While the underlying assumptions of the linear-flow model differ from those of a double-porosity radial-flow model, the properties calculated for the Culebra are similar to those previously presented and indicate a basic insensitivity to the system flow model. In addition to yielding hydrologic values that are approximately the same, the two models are complementary and provide unique information for characterizing the aquifer - double-porosity parameters from one model, and the orientation and width of a high-permeability elongated strip from the other. The two interpretations also provide a consistent picture of an extensively fractured porous medium in the vicinity of the H-3 hydropad. 24 refs., 27 figs., 3 tabs.

47232 **(UCRL—53761) Waste package performance assessment: Deterministic system model, program scope and specification.** O'Connell, W.J.; Drach, R.S. (Lawrence Livermore National Lab., CA (USA)). 2 Oct 1986. Contract W-7405-ENG-48. 50p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013821.

Integrated assessments of the performance of nuclear waste package designs must be made in order to qualify waste package designs with respect to containment time and release-rate requirements. PANDORA is a computer-based model of the waste package and of the processes affecting it over the long terms, specific to conditions at the proposed Yucca Mountain, Nevada, site. The processes PANDORA models include: changes in inventories due to radioactive decay, gamma radiation dose rate in and near the package, heat transfer, mechanical behavior, groundwater contact, corrosion, waste form alteration, and radionuclide release. The model tracks the development and coupling of these processes over time. The process models are simplified ones that focus on major effects and on coupling. This report documents our conceptual model development and provides a specification for the computer program. The current model is the first in a series. Succeeding models will use guidance from results of preceding models in the PANDORA series and will incorporate results of recently completed experiments and calculations on processes affecting performance. 22 refs., 21 figs., 9 tabs.

47233 (UJV—7832-CH, pp 28-44) **Research in the field of radioactive wastes in the Nuclear Research Institute.** Hron, M.; Kyrs, M.; Napravnik, J.; Vojtech, O. Jan 1986. NTIS (US Sales Only), PC A03/MF A01. File Number DE87780158.

In Progress of the Institute of Nuclear Research, Rez in the field of radiochemical and irradiation technology.

The concept is described of radioactive waste processing and disposal in Czechoslovakia. Bituminization technology was developed for processing liquid radioactive wastes and organic ion exchangers from nuclear power plants. A bituminization line was designed which is now being operated at Jaslovske Bohunice. The operation is briefly described and basic specifications given. Mobile solidification unit MESA I was designed for processing low level wastes. It can be installed in the required place in a short time. The unit can also be used for processing radioactive wastes from other industries. The configuration of the unit is described and detailed technical data and specifications are presented. The development is discussed of vitrification processes for high level radioactive wastes (E.S.).

47234 (UTNL-R—0190, pp 8-16) **Present status and problems of conventional off-gas cleaning system.** Matsuoka, Shingo; Sakurai, Tsutomu; Natsume, Haruo. (Tokyo Univ., Tokai, Ibaraki, Japan. Nuclear Engineering Research Lab.). 1986. (In Japanese). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780159.

In Study on removal and fixation for radioactive materials in dissolver off-gas.

The off-gas from reprocessing dissolution process contains volatile radioactive nuclides such as H-3, Kr-85, I-129 and C-14. The establishment of the method for removing or fixing them in order to prevent the release into environment is a social concern. The study group investigated the present status of the research and development on the volatile nuclides from the generation to the disposal, and attempted to set up the off-gas cleaning system which is considered to be more rational. It is important that the dissolution off-gas cleaning system is composed of the processes which are highly safe and reliable, economical and simple. It is necessary to pay attention to use the techniques of high reliability, to remove strongly corrosive nuclides such as iodine at the first step, to make the system into a continuous type or close to it to prevent the accumulation of radioactive substances, to avoid high temperature, high pressure operation as far as possible, to avoid the use of toxic and highly explosive chemical substances and to make the process flexible so as to be able to cope with the variation of operational condition. From these viewpoints, the existing off-gas cleaning system was examined, and the plan of its improvement was proposed as a total off-gas cleaning system. (Kako, I.).

47235 **(UTNL-R—0190) Study on removal and fixation for radioactive materials in dissolver off-gas.** (Tokyo Univ., Tokai, Ibaraki (Japan). Nuclear Engineering Research Lab.). 1986. vp. (In Japanese). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780159.

Separate abstracts were prepared for individual sections of the report.

47236 **Inferences about the local stress field from focal mechanisms: Applications to earthquakes in the southern Great Basin of Nevada.** Harmsen, S.C.; Rogers, A.M. *Bulletin of the Seismological Society of America;* **76**: No. 6, 1560-1572(Dec 1986).

Focal mechanisms determined from regional-network earthquake data or aftershock field investigation often contain members ranging from strike slip to normal slip in extensional tectonic environments or from strike slip to thrust slip in compressional environments. Although the coexistence of normal and strike-slip faulting has suggested to some investigators that the maximum and intermediate principal stresses are of approximately equal magnitude, several have asserted that the directions of principle stresses can or must interchange to accommodate both types of mechanisms (Zoback and Zoback 1980b; Vetter and Ryall, 1983). A Coulomb-Navier criterion of slip is invoked to demonstrate that both types of mechanisms, as well as oblique members having preferred nodal-plane dips intermediate between those of the strike-slip and normal mechanisms, may be observed in a region where the stress field, resolved into principal components, is axially symmetric. The proximate coexistence of earthquakes having diverse focal mechanisms could be interpreted as evidence for an approximately axially symmetric stress field in a region where optimally oriented planes of weakness are known to exist in the host rock. 10 refs., 6 figs.

47237 **Design of radioactive tailings disposal sites to last 1,000 years.** Timm, C.M. (Jacobs Engineering Group Inc., Albuquerque, NM 87108). pp 441-449 of Proceedings of the international conference on new frontiers for hazardous waste management. Cincinnati, OH; Environmental Protection Agency (US) (1985). (CONF-850960—).

From International conference on new frontiers for hazardous waste management; Pittsburgh, PA, USA (15 Sep 1985).

EPA/600/9-85/025.

Cleanup and stabilization is currently being conducted by the Department of Energy at 24 inactive uranium mill sites involving from 100,000 to more than 3,000,000 cubic yards of radioactive tailings and other contaminated materials. The majority were built on the banks of or very close to rivers so most of the tailings piles are in floodplains and vulnerable to flood erosion. Another common problem is ground-water contamination. This paper discusses the selection of design criteria sufficiently conservative to assure a high probability that the embankment will last 1,000 years or more essentially intact. Among the criteria utilized in the designs are the application of Maximum Credible Earthquake, Probable Maximum Precipitation and Probable Maximum Flood to the location, and configuration of the proposed disposal site.

47238 **Greater-confinement disposal of low-level radioactive wastes.** Trevorrow, L.F.; Gilbert, T.L.; Luner, C.; Merry-Libby, P.A.; Meshkov, N.K.; Yu, C. (Environmental Research Div., Argonne National Lab., Argonne, IL 60439). pp 433-440 of Proceedings of the international conference on new frontiers for hazardous waste management. Cincinnati, OH; Environmental Protection Agency (US) (1985). (CONF-850960—).

From International conference on new frontiers for hazardous waste management; Pittsburgh, PA, USA (15 Sep 1985).

EPA/600/9-85/025.

GCD (Greater-Confinement-Disposal) include the augered shaft, deep trench, engineered structure, hydrofracture, improved waste form, and high-integrity container. Selection of an appropriate design must also consider the interplay between basic risk limits for protection of public health and safety, performance characteristics and objectives, costs, waste-acceptance criteria, waste characteristics, and site characteristics. This paper presents an overview of the factors that must be considered in planning the application of methods proposed for providing greater confinement of low-level wastes.

47239 **Waste disposal by hydrofracture and application of the technology to the management of hazardous wastes.** Stow, S.H.; Haase, C.S.; Weeren, H.O. (Oak Ridge National Lab., P.O. Box X, Oak Ridge, TN 37831). pp 138-144 of Proceedings of the international conference on new frontiers for hazardous waste management. Cincinnati, OH; Environmental Protection Agency (US) (1985). (CONF-850960—). Contract AC05-84OR21400.

From International conference on new frontiers for hazardous waste management; Pittsburgh, PA, USA (15 Sep 1985).

EPA/600/9-85/025.

A unique disposal method, involving hydrofracturing, is used for management of liquid low-level radioactive wastes at Oak Ridge National Laboratory (ORNL). Wastes are mixed with cement and other solids and injected along bedding plane fractures into highly impermeable shale at a depth of 300 m forming a grout sheet. The process has operated successfully for 20 years and may be applicable to disposal of hazardous wastes. The cement grout represents the primary barrier for immobilization of the wastes; the hydrologically isolated injection horizon represents a secondary barrier. Research is also conduced on the development of methods for monitoring the extend and orientation of the grout sheets; these methods include gamma-ray logging of cased observation wells, leveling surveys of benchmarks, tiltmeter surveys, and microseismic arrays.

0530 Environmental Aspects

REFER ALSO TO CITATION(S) 47227, 47232, 47467, 47595

47240 **(PB—87-205217/XAB) Estimates of population distributions and tailings areas around licensed uranium mill sites. Final report.** Hans, J.M.; Hall, J.B.; Moore, W.E. (Environmental Protection Agency, Las Vegas, NV (USA). Office of Radiation Programs). Aug 1986. 89p. (EPA—520/6-86/020). NTIS, PC A05/MF A01.

Population distributions and tailings areas were estimated from aerial photography for each of 21 licensed uranium millsites. Approximately 11,600 persons live within 5 kilometers of the tailings impoundments at the millsites. About 82% of these persons live near five of the millsites. No persons were found living within 5 kilometers of six of the millsites. Tailings area measurements include the surface area of tailings in impoundments, heap-leached ore, and carryover tailings in evaporation ponds. Approximately 4,000 acres of tailings surfaces were measured for the 21 millsites. About 55% of the tailings surfaces were dry, 11% wet, and the remainder ponded. The average tailings surface area for the millsites is about 200 acres and ranges from 7 to 813 acres.

0540 Health And Safety

REFER ALSO TO CITATION(S) 47193, 47223, 47238, 47467

47241 (INIS-mf—10948, pp 37-40) **Decontamination of organic polymer surfaces.** Smirous, F. (Vysoka Skola Chemicko-Technologicka, Prague, Czechoslovakia). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

The questions are discussed of decontamination of organic polymer surfaces. For decontamination, water is most frequently used or decontamination solutions containing water or other solvents and adsorbents, most frequently in paste form. Briefly discussed are procedures involving decontamination solutions disturbing the surface and those involving mechanical removal of the surface. Limitations are outlined within which the individual techniques can be applied and factors are shown deciding on the choice of decontamination procedures or of replacing decontamination by the disposal of radioactive wastes. (Z.M.).

47242 (INIS-mf—10948, pp 41-50) **Measurement of contamination and decontamination properties of protective surfaces at nuclear power plants.** Breda, M. (Vyzkumny Ustav Pozemnich Staveb, Prague, Czechoslovakia. Radioisotopove Oddeleni). 20 Aug 1986. (In Czech). NTIS (US Sales Only), PC A05/MF A01. File Number DE87702906. (CONF-8510469—).

From DEK decontamination workshop; Rez, Czechoslovakia (29 Oct 1985).

A method was developed for objective assessment of suitability of protective coatings for surfaces in nuclear power plants with respect to their consisting in standard contamination of the tested surface with isotope In-113m and its decontamination using an agreed upon method. A GAMMA scintillation system from Hungary is used for activity counting. The decontamination solution consists of 20 g oxalic acid, 20 g amonium oxalate, 10 ml nitric acid, 10 ml phosphoric acid, 20 ml of a detergent, and distilled water to complete 1 litre. The results of the measurement are processed using a Varian 620/L computer. (Z.M.).

0550 Safeguards, Inspection, And Accountability

REFER ALSO TO CITATION(S) 47581

47243 **(EUR—10377) Calibration and experimental comparison of the active well coincidence counter and PHONID-II.** Schenkel, R.; Smith, B.G.R.; Tsalas, S. (Commission of the European Communities, Luxembourg). 1986. 45p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752559.

A team from EURATOM-Luxembourg, JRC-Ispra, Los Alamos, and International Atomic Energy Agency (IAEA) has performed measurements to directly compare the Active Well Coincidence Counter (AWCC) with the PHONID-II for the assay of highly enriched uranium (HEU). The comparison included an evaluation of counting rates, sensitivity, accuracy, linearity, stability, and matrix effects. Samples used in the evaluation included highly enriched uranium metal, U/sub 3/O/sub 8/ U-Al alloy plates, UF/sub 4/, and (uranium/thorium) coated particles covering the mass range from a few grams up to about 5 kg of /sup 235/U. These materials are typical of the HEU samples under inspector verifica-

tion. This report gives the results of the intercomparison as well as calibration information for the above material categories.

47244 **(HEDL-SA—3669-FP) Risk evaluation system for facility safeguards and security planning.** Udell, C.J.; Carlson, R.L. (Hanford Engineering Development Lab., Richland, WA (USA)). 1 Jul 1987. Contract AC06-76FF02170. 5p. (CONF-870713—54). NTIS, PC A02/MF A01; GPO Dep. File Number DE87014379.

From 28. INMM annual meeting on safeguards: a mature technology; Newport Beach, CA, USA (12 Jul 1987).

The Risk Evaluation System (RES) is an integrated approach to determining safeguards and security effectiveness and risk. RES combines the planning and technical analysis into a format that promotes an orderly development of protection strategies, planing assumptions, facility targets, vulnerability and risk determination, enhancement planning, and implementation. In addition, the RES computer database program enhances the capability of the analyst to perform a risk evaluation of the facility. The computer database is menu driven using data input screens and contains an algorithm for determining the probability of adversary defeat and risk. Also, base case and adjusted risk data records can be maintained and accessed easily.

47245 **(LA—11021-MS) A confirmatory measurement technique for highly enriched uranium.** Sprinkle, J.K. Jr. (Los Alamos National Lab., NM (USA)). Jul 1987. Contract W-7405-ENG-36. 15p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014705.

This report describes a confirmatory measurement technique for measuring uranium items in their shipping containers. The measurement consists of a weight verification and the detection of three gamma rays. The weight can be determined very precisely, thus it severely constrains the options of the diverter who might want to imitate the gamma signal with a bogus item. The 185.7-keV gamma ray originates from ^{235}U, the 1001 keV originates from a daughter of ^{238}U, and the 2614 keV originates from a daughter of ^{232}U. These three gamma rays exhibit widely different attenuation properties, they correlate with enrichment and total uranium mass, and they rigorously discriminate against a likely diversion scenario (low-enriched uranium substitution). These four measured quantities, when combined, provide a signature that is very difficult to counterfeit.

47246 **(LA—11039-MS) A neutron detector based on microchannel plates.** MacArthur, D.W. (Los Alamos National Lab., NM (USA)). Jun 1987. Contract W-7405-ENG-36. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014703.

We propose a large-area neutron detector design based on microchannel plates (MCPs). Two characteristics of the MCP make it ideal as a high-rate neutron detector: (1) its signals can have a very fast rise time, and (2) it can count at a high rate. The MCP-based detector could use both the high-voltage power supplies and the readout electronics designed for a neutron detector based on the multiwire proportional chamber (MWPC).

47247 **(MLM—3448(OP)) Application of prediction of equilibrium to servo-controlled calorimetry measurements.** Mayer, R.L. II. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 1987. Contract AC04-76DP00053. 8p. (CONF-870713—58). NTIS, PC A02. File Number DE87013745.

From 28. INMM annual meeting on safeguards: a mature technology; Newport Beach, CA, USA (12 Jul 1987).

Research was performed to develop an endpoint prediction algorithm for use with calorimeters operating in the digital servo-controlled mode. The purpose of this work was to reduce calorimetry measurement times while maintaining the high degree of precision and low bias expected from calorimetry measurements. Data from routine operation of two calorimeters were used to test predictive models at each stage of development against time savings, precision, and robustness criteria. The results of the study indicated that calorimetry measurement times can be significantly reduced using this technique. The time savings is, however, dependent on parameters in the digital servo-control algorithm and on packaging characteristics of measured items. 7 refs., 4 figs., 1 tab.

47248 **(NUREG/CR—5002) Methods for recurring loss tests.** Johnston, J.W.; Kinnison, R.R.; Littlefield, J.S.; Smith, B.W. (Pacific Northwest Lab., Richland, WA (USA); Nuclear Regulatory Commission, Washington, DC (USA). Div. of Safeguards). Sep 1987. Contract AC06-76RL01830. 56p. (PNL—6249). NTIS, PC A04/MF A01 - GPO. File Number DE88000300.

Development of a program to use material control and accounting data for detecting recurring losses of nuclear material is described and some potential statistical methods are discussed. A moving sum test, including a moving α for false alarm control, is described. Three non-parametric tests are discussed because of simplicity of use and because an estimation of the variance of the process difference is not required. Considerations for a computer system to collect and process recurring loss test data are identified and discussed. 20 refs., 17 figs., 9 tabs.

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY

REFER ALSO TO CITATION(S) 47933

0701 Physical Isotope Separation

REFER ALSO TO CITATION(S) 48038, 48483

47249 **(INS—605) INS gas-filled recoil isotope separator.** Miyatake, M.; Nomura, T.; Kawakami, H. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Sep 1986. 17p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702928.

The characteristics and performance of a small sized gas-filled recoil isotope separator recently made at INS are described. The total efficiency and the ΔBrho/Brho values have been measured using low velocity /sup 16/O, /sup 40/Ar and /sup 68/As ions and found to be 10 and 5 %, respectively. The Z-dependence of the mean charge is discussed.

47250 (ZfK—590, pp 2-3) **/sup 99/Mo production at AMOR-1 in the years 1984 to 1985.** Eckardt, A.; Sander, C.; Handtrack, C.; Matthes, H.; Lincke, H.J. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

47251 (ZfK—590, pp 4-5) **Investigation of a 1850-MBq-/sup 90/Sr//sup 90/Y-generator.** Jantsch, K.; Poser, D.; Thieme, K. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

47252 **Design of a fully automated, in-beam, continuous-flow I-123 production system.** Mirzadeh, S.; Mausner, L.F.; Srivastava, S.C. (Brookhaven National Lab., Upton, NY). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-1, 1280-1283(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

Iodine-123 has been prepared at the Brookhaven Linac Isotope Producer (BLIP) from the Xe-123 precursor produced by I-127(p,5n) reaction. The radiopurity is excellent and the chemical form suitable for labeling. However, the relatively time consuming, labor intensive, and inefficient batch mode is not readily scaled up to allow BLIP to become a meaningful contributor in a nationwide distribution effort. The in-beam, continuous-flow process will help solve this problem because it offers much higher I-123 yield and is amenable to automation. We describe here the target design and our system for fully automated production.

47253 **BLIP II: a new spallation radionuclide research and production facility.** Mausner, L.F.; Mirzadeh, S.; Srivastava, S.C. (Brookhaven National Lab., Upton, NY). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1386-1388(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

The Brookhaven Linac Isotope Producer (BLIP) was the world's first facility to demonstrate the capability of a large linac for efficient medical radionuclide production by proton spallation and lower energy reactions. A new, updated system (BLIP II) is described which provides more reliable operations due to new components and simplified design, better repairability, much faster target handling, a reduced personnel radiation exposure, and a new capability to explore the use of high energy neutrons for producing neutron rich species.

08 HYDROGEN

0801 Production

REFER ALSO TO CITATION(S) 47262

47254 **Oxygen exchange reactions during methanol steam reforming.** Vanderborgh, N.E.; Goodby, B.E.; Springer, T.E. (Electronics Div., Los Alamos National Lab., Los Alamos, NM 87545). pp 623-628 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—).

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

Results show unequivocal catalyst lattice oxygen incorporation in carbon dioxide product gases during hydrogen generation. These data show the carbon-oxygen bond in methanol is severed during the reaction pathway to form CO/sub 2/, but not CO. Most likely methanol adsorbs into an oxide-defect site. Carbon monoxide results from a hydrogen abstraction process that keeps the carbon from the surface; desorption gives CO with no change in the C-O bond. Carbon dioxide production requires the C-O residue to fall into the surface, forming a bridged -O-C-O-molecule that permits scrambling of the oxygen atoms. Depending upon charge distribution, set much by the cation surface concentrations, the bridges -O-C-O- will show evidence of a "formate" radical. Desorption leads to product carbon dioxide.

47255 **Photosynthetic water splitting: A biotechnological approach to gaseous fuel synthesis.** Greenbaum, E.; Reeves, M. (Chemical Technology Div., Oak Ridge National Lab., Oak Ridge, TN 37831). pp 1092-1097 of Proceedings of the 1986 international gas research conference. Cramer, T.L. Rockville, MD; Government Institutes Inc. (1986). (CONF-860904—). Contract AC05-84OR21400.

From International gas research conference; Toronto, Canada (8 Sep 1986).

Photosynthesis research in the Chemical Technology Division of Oak Ridge National Laboratory is focussed on understanding the physicochemical aspects of photosynthesis, with specific application to developing a biotechnological process for production of gaseous fuels from renewable inorganic materials. This paper provides a general review of photosynthetic water splitting by intact microalgae and platinum-modified chloroplasts for the simultaneous photoproduction of molecular hydrogen and oxygen.

47256 **Hydrogen generation from the photolytic decomposition of water.** Frank, A.J.; Gratzel, M. (Solar Energy Research Institute). pp 1084-1091 of Proceedings of the 1986 international gas research conference. Cramer, T.L. Rockville, MD; Government Institutes Inc. (1986). (CONF-860904—).

From International gas research conference; Toronto, Canada (8 Sep 1986).

This paper outlines several important discoveries in the authors' laboratories relating to the solar production of H/sub 2/ from the photolytic decomposition of water. Significant advances have been made in research on particulate and thin-film semiconductor systems for the photochemical conversion of sunlight. Better understanding and control of charge-transfer and catalytic processes have been obtained. New, stable, molecular semiconductors with good solar spectral response have been developed. Also, wide-band-gap TiO/sub 2/ has been derivatized with transition metal complexes to improve its solar spectral response. Very active Pt clusters for catalyzing the production of hydrogen from water have been synthesized and characterized. A method for minimizing the recombination of H/sub 2/ and O/sub 2/ in dispersed systems has been extensively investigated and exploited to improve the quantum yields of the water-cleavage reaction.

0802 Storage

47257 **Effect of methane on the rate of hydrogen absorption by $LaNi_5H$/sub x/ in liquid suspension.** Reilly, J.J.; Johnson, J.R.; Gamo, T. (Brookhaven National Lab., Upton, NY). *Journal of the Less-Common Metals;* **131**: 131(15 Mar 1987). (CONF-8605114—). Contract AC02-76CH00016.

From Properties and applications of metal hydrides; Maubuisson, France (25 May 1986).

The effect of CH_4 upon the kinetics of the absorption of hydrogen by $LaNi_5H$/sub x/ suspended in n-undecane was determined at two different gas compositions: 5 and 25 mol.% CH_4 in H_2. The systems behave similarly to those studied in the absence of CH_4 and the same rate equation holds. The rate-limiting process is dissolution of hydrogen in the liquid phase. The activation energy for this process, E/sub s/, varied with CH_4 pressure; at 40 kPa, E/sub s/ $=9.3+-0.5$ kJ (mol H_2)$^{-1}$, at 253 kPa, E/sub s/$=5.5+-0.9$ kJ (mol H_2)$^{-1}$. The pre-exponential factor in the rate equation is reduced by the presence of CH_4; however, the absorption rate is very little changed relative to pure hydrogen in the gas phase because of the lower E/sub s/. The reduction of E/sub s/ is attributed to the dissolution of CH_4 in the liquid phase and a consequent lowering of its surface tension.

47258 **Kinetics of the absorption of hydrogen by $LaNi_5H$/sub x/ suspended in aqueous solutions.** Gamo, T.; Johnson, J.R.; Reilly, J.J. (Brookhaven National Lab., Upton, NY). *Journal of the Less-Common Metals;* **131**: 131(15 Mar 1987). (CONF-8605114—). Contract AC02-76CH00016.

From Properties and applications of metal hydrides; Maubuisson, France (25 May 1986).

The kinetics of the absorption of hydrogen by $LaNi_5H$/sub x/ suspended in pure water and in a 0.1% surfactant solution were studied. The pure water system behaves similarly to those employing the organic solvents studied previously. The same rate equation is obeyed and the rate-limiting process is the dissolution of hydrogen in the liquid phase. The activation energy was found to be 15.5 +- 1.3 kJ (mol H_2)$^{-1}$. The absorption rates in the surfactant suspension were substantially higher than in the pure water system, but the data was scattered and could not be fitted to the usual rate equation. The effects of corrosion of $LaNi_5$ by the aqueous solutions are discussed. The rates of dissolution of hydrogen in pure water and the surfactant solution obeyed first-order kinetics; the respective activation energies were determined to be $15.4+-1.4$ and $11.9+-1.4$ kJ (mol H_2)$^{-1}$.

47259 **Hydrides of the double metal-layered monohalides: structural and bonding features of Zr_2Br_2H, ZrBrH and YClH/sub z/ type phases.** Wijeyesekera, S.D.; Corbett, J.D. (Ames Lab., IA; Iowa State Univ. of Science and Technology, Ames). *Journal of the Less-Common Metals;* **131**: 131(15 Mar 1987). (CONF-8605114—). Contract W-7405-ENG-82.

From Properties and applications of metal hydrides; Maubuisson, France (25 May 1986).

0808 Properties

REFER ALSO TO CITATION(S) 47039

09 OTHER SYNTHETIC AND NATURAL FUELS

0901 Hydrocarbon Fuels

47260 **(DOE/PC/80011—T2) Development and process evaluation of improved Fischer-Tropsch slurry catalysts: Quarterly technical progress report for the period 1 January to 31 March 1987.** Withers, H.P.; Bukur, D.B.; Rosynek, M.P. (Air Products and Chemicals, Inc., Allentown, PA (USA); Texas A and M Univ., College Station (USA)). 9 Jun 1987. Contract AC22-85PC80011. 88p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000298.

Optimal experimental conditions for preparation of Fe/Cu/K catalysts have been identified. Using this procedure the following catalysts were prepared (100 g of each): 100% Fe, 100 Fe/0.05 K, 100 Fe/0.1 K, 100 Fe/0.2 K, 100 Fe/1.0 K and 100 Fe/2.0 Cu. Five Fe/Cu catalysts have been characterized by a temperature programmed reduction technique for their comparative reduction behaviors. Programs for automatic peak identification of all components appearing in gas, aqueous and organic phase have been developed and tested. Response factors and retention times for organic phase components have been determined. Shakedown runs in the fixed bed and the slurry reactor were performed with a fused iron catalyst. No major operational problems were encountered during over 140 hours of continuous operation in both systems. In general, very good mass balance closures were obtained in both reactor systems and the products were found to follow Anderson-Schulz-Flory distribution over a wide range of carbon numbers.

47261 **(KTM/E-D—134) Biogas originating from the waste collected to the Vuosaari dumping site.** Jaanu, K.; Helminen, L. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 129p. (In Finnish). NTIS (US Sales Only), PC A07. File Number DE87753345.

This study, financed by the Helsinki Metropolitan Area Council and the Ministry of Trade and Industry, describes the real amount and quality of biogas originating from the waste, mainly solid waste, collected to the Vuosaari dumping site, where the pilot plant used in this study is located. This paper further studies the control of the amount of biogas according to consumption and environmental conditions, practical application of giogas in energy generation, related equipment with cost effects and the effect of biogas production on the waste volume and reduction of environmental hazards. This project was started on the Vuosaari dumping site, in an area of about 2.8 ha in May 1985. The pilot plant of about 500 kW was ready for a trial run in February 1986, after which the trial production was started. Under the additional programme the test project was expanded by boiler testing in summer 1986. The test operation was completed at the end of 1986, at which biogas had been sucked and burnt about 150,000 m"3n, equivalent to 2775 GJ of energy. The average methane content of biogas varied from 50 to 52%. The combustion properties of biogas were good. On the basis of the test results, technical and economic, and of the environmental aspects, the Vuosaari dumping site should be brought into practical use as soon as possible. In the same way, other dumping sites in Finland containing more than 500 000 tonnes of waste should be brought into use because the recovery of biogas produces energy, reduces gaseous emissions, the need of waste water treatment, and the need of dumping site space.

47262 **(PB—87-215695/XAB) Limits of thermochemical and photochemical syntheses of gaseous fuels: a finite-time thermodynamic analysis. Annual report, January-December 1985.** Berry, R.S. (Chicago Univ., IL (USA)). 28 Jan 1986. 191p. NTIS, PC A09/MF A01.

See also report for Sep 1983-Feb 1985, PB—85-220622.

The methods of evaluating processes for gaseous-fuel synthesis are generalized and applied to complex thermochemical processes, to photochemical and biophotochemical processes, and to electrolytic processes. Thermochemical methods do not appear promising in thermodynamic terms, even with careful strategies of heat transfer. Photochemical processes may be more advantageous, and electrochemical processes best of all, if no significant costs are associated with the production of electricity. The part of the project devoted to optimization of paths deals with finding optimal currents, as functions of time, for various fuel cells.

47263 **(PB—87-217451/XAB) Measurement and interpretation of the solubility of a normal fluid in a hydrogen-bonding solvent: the methane-methanol system. Topical report.** Kobayashi, R.; Hong, J.H.; Jett, M.D.; Malone, P.V. (Rice Univ., Houston, TX (USA). Dept. of Chemical Engineering). Sep 1986. 29p. NTIS, PC A03/MF A01.

Experimental vapor-liquid equilibrium were been obtained for the methane-methanol system at 200, 220, 250, 273.15, 290, and 310 K at pressures to 400 atmospheres. The pressures studied at each temperature were in response to a Krichevsky-Kasarnovsky plot of the data. An initial negative slope for each isotherm indicated the need for a Krichevsky-Iliinskaya form of representation taking into account highly nonideal liquid-phase behavior. The solubility data are found to follow the Krichevsky-Iliinskaya equation over the entire range of the experiments using an unsymmetric 2-suffix Margueles activity coefficient expression. The vapor-liquid equilibrium behavior show characteristics typical of systems exhibiting two-liquid phases at some lower temperatures or a frequently encountered supercritically extractive system. A qualitative explanation of the observed behavior is given.

47264 **(VH-Mon—442) Energy recovery of the sludge in small sewage treatment plants.** Alavakeri, M.; Paukkunen, H. (National Board of Waters, Helsinki (Finland)). 1986. 67p. (In Finnish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753326.

The goal of this study was to clear up the suitability of a prefabricated reactor for municipal sludge digestion and energy recovery. The startup of the digestion process took place in March 1984 and the study took 16 months for experiments and data collection. The following periods can be listed as conclusion from the test run: mesophilic digestion, thermophilic digestion and mesophilic digestion with an additional heat exchanger in order to preheat the feed sludge with the withdrawn sludge. The feed sludge characteristics during the test run were on an average as follows: TS 6.2 percent and VS 57 percent of total solids. Grit materials accumulated in the reactor and caused troubles in the operation of the digester. This means that the plant's grit removal facilities must operate at top efficiency. It took at least one month to establish a stable mesophilic digestion. The stabilitation of the thermophilic digestion takes a fairly long time, up to one year. In the test run a stable state was not achieved, as it can be seen from VA/Alk-ratio. During the 12 weeks' test period of the thermophilic temperature in the autumn 1984 it was observed that the biogas yield was not enough to keep the right temperature in the process. The estimated investment costs of the ACP-plant (pe 3,000) are FIM 1.5 million. The operation costs, evaluated at an annual level are FIM 75,000. Total costs, including annual capital costs and operation costs, are FIM 226,000. The energy price of excess gas available for other use in the plant is FIM 3.40/kWh.

47265 **Overview of DOE Alternative Fuels Utilization Program.** Graves, R.L.; Mc Gill, R.N. (Oak Ridge National Lab., Oak Ridge, TN). pp 101-112 of Proceedings of the 24th automotive technology development contractors coordination meeting (P-197). Warrendale, PA; Society of Automotive Engineers (1986). (CONF-861002—). Contract AC05-84OR21400.

From Automotive technology development contractors' coordination meeting; Dearborn, MI, USA (27 Oct 1986).

The Department of Energy Alternative Fuels Utilization Program encompasses a wide range of applied research activities and recently undertook implementation of the Federal Methanol Fleet Project. Research is conducted on various forms of synthetic fuels and alcohol fuels, examples of which are described in this paper. The Federal Methanol Fleet began operating its first group of vehicles in November 1985. The findings to date and future plans are summarized in the paper. The Alternative Fuels Utiliza-

tion Program currently encompasses two significant projects in alternative transportation fuels: (1) the Alternative Fuels Utilization Project, a long range activity of applied research and development (2) The Federal Methanol Fleet Project, an effort initiated by Congress in FY 1985 to introduce methanol vehicles into the fleet of Federally-owned vehicles. The overall objectives and summaries of activities are described in this paper. The Oak Ridge National Laboratory serves as field project office for both projects.

0902 Alcohol Fuels

REFER ALSO TO CITATION(S) 47265, 47715

47266 **(DOE/PC/70780—T8) Trifunctional catalysts for conversion of syngas to alcohols: Twelfth quarterly report for period June 1, 1987 to August 31, 1987.** Bischoff, K.B.; Manogue, W.H.; Mills, G.A.; Bhore, N. (Delaware Univ., Newark (USA). Center for Catalytic Science and Technology). 25 Sep 1987. Contract FG22-84PC70780. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000055.

A methodology for preparing NMR samples was developed. In this method the sample is first treated in the cell and is transferred directly into the NMR sample holder. Preliminary NMR results show the presence of various absorbed CO species on Rh/Al_2O_3. The absence of a NMR signal from adsorbed CO on Rh-Mo/Al_2O_3 is attributed to the presence pf paramagnetic Mo(+5) species. An order of magnitude analysis shows that the minimum distance between Mo(+5) and ^{13}CO is of the order of 5 A. This short distance makes possible diffusion of chemical intermediates and further corroborates a dual-site mechanism. Ion scattering spectra show evidence for an increase in aggregation of molybdena in the presence of rhodium. Oxygen intensity ratio from ISS studies is found to be good indicator for molybdena dispersion. X-ray Diffraction studies of air calcined, reduced catalysts do not show any detectable rhodium, molybdenum, rhodium oxide, any molybdenum oxide, or Mo-Rh_2O_3 in Rh-Mo/Al_2O_3 system. 3 refs., 7 figs.

0904 Solid Waste And Wood Fuels

REFER ALSO TO CITATION(S) 47105, 48164

47267 **(ETSU-R—40) Proceedings of an international workshop on straw as fuel.** Martindale, L.P. (Department of Energy, London (UK)). May 1986. 99p. NTIS (US Sales Only), PC A05/MF A01.

The Energy Technology Support Unit, acting on behalf of the UK Department of Energy, organised an International Workshop on Straw as Fuel at Robinson College, Cambridge on 6 March 1986. Nine countries were represented - Austria, Denmark, France, Hungary, Norway, Republic of Ireland, Spain, Sweden and the United Kingdom. Two delegates represented also the Food and Agriculture Organisation of the United Nations (FAO) and the Commission of the European Communities (CEC). The objectives of the Workshop were to identify the extent to which straw is currently being used as fuel and how much might be used in the future, to clarify the status of technologies and economics of use of straw as fuel, to exchange practical experiences, to review National Research Development and Demonstration Programmes and identify where future emphasis might lay.

47268 **(KTM/E-D—113) Delivery and distribution of the domestic solid fuels in the North-Ostrobotnia.** Oksanen, R. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 72p. (In Finnish). NTIS (US Sales Only), PC A04. File Number DE87753344.

Peat and energy wood resources in North-Ostrobotnia are rich considering the production and use. The production of peat is 2.5 fold compared to use. The resources of energy wood on the region make increasing of use easily even manifold. The material currents should be examined logistically from the beginning to the end of the chain, when the delivery and distribution chains are developed. The developing should be done in the limited area, where it exists enough production capasity and basic demand. The further study for testing of chains in use is a qualification for rating how working and recommending are the production - transport - use chains for a real use. Both the really forming of the energy price and economy and profitable of the chains can be cleared up making experiment in practice with different alternatives. The aim of the further study is to improve the capable of competing and the use of indigenous fuels, especially by developing the delivery- and distribution chains between producers and users. As far as the price of chips or district heating plant will be capable of competing, the annual use of chips will be increased about 2.6-fold. The planned experiment would last two heating season. The further study provided, that the state will finance the delivery support of energy and reserch expenses.

47269 **(KVL-JI-MEDD—57) Straw-fueled furnace with gas scrubbers.** Kofoed Nielsen, H. (Kongelige Veterinaer- og Landbohoejskole, Tastrup (Denmark). Jordbrugsteknisk Inst.). Jan 1987. 79p. (In Danish). NTIS (US Sales Only), PC A05/MF A01. File Number DE87753058.

This report describes a project on straw combustion. During the project a prototype straw furnace was constructed. It uses a flue gas scrubber as heat exchanger in stead of a normal water jacket. The straw furnace has a thermal efficiency of 90%. The furnace and the flue gas scrubber transfer about 80% of the straw heat content into the water. From 16 to 60 kW the function of the furnace was fine. Furthermore, the furnace was able to handle and to burn straw with 50% moisture with an efficiency of 87%. A good correlation between the predictions of the mathematical model and the temperatures in the furnace measured during the tests was obtained. The combustion was very clean as the temperature in the secondary combustion chamber always was above the ignition temperature for the volatile gases. This too is proved by the measured content of carbon monooxide which was 0.0% in the flue gas. The idea of having two combustion chambers was preferable. Especially as the connecting pipe between two chambers secured good mixing of the volatiles and oxygen. The frame with the nozzles on the primary combustion chamber worked well and provided a good combustion. A large distance between the nozzles in the direction of the movement of the bales was best. It is a reliable furnace and compared to the furnaces its cost is low. (EG). 66 refs.

47270 **(MT-TIED—389) Model for optimising the use of wood raw material.** Eskelinen, A.; Haeggblom, R.; Peltonen, J. (Metsaeteho, Helsinki (Finland)). 1984. 30p. (In Finnish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753338.

The mill price of wood is higher in Finland than in our major competitor countries. This forces Finnish industry to develop harvesting and transport methods and plan procurements with the emphasis on integration of wood procurement with the mill processing and forest products marketing into an entrepreneurial economic entity. One challenge which will affect the procurement costs is the increase in the need for forest thinnings. The need for thinnings will increase from 100,000 ha at the beginning of this decade to 600,000 ha in 1990s. The major parat of this is first thinnings. At today's price levels that will mean additional harvesting costs of more than 250 million Fmks to the forest industry. The calculation model has been used in wood raw material optimising calculations for several Finnish forest industry companies, which were either starting to procure raw material by the tree-section and/or the forest chipping methods, or were already partly doing it. The use of the model will spread, because of the improved capability of industrial processes for accepting partly treated pulpwood and utilising energy wood. Experience shows that application of the model makes for more reliable determination of the economical volumes of raw material to be procured, as well as better planning and choice of investment objects for both the mill and wood procurement.

47271 **(PB—87-210472/XAB) Understanding wood wastes as fuel. Technical paper.** Vogler, J. (Volunteers in Technical Assistance, Inc., Arlington, VA (USA)). 1986. 29p. (VITA/TP—46:3/86). NTIS, PC PC E04/MF A01.

The publication addresses the following subjects: Combustion in wood-burning stoves; modern air-tight stoves; advanced stove designs; dangers of simple stoves; burning sawdust; compacting wood wastes; sawdust briquettes; high-tech briquetting process;

retting and pressing; making charcoal; various kilns; charcoal briquettes; binders for briquetting.

47272 **Rural electricity in the Philippines - planning issues.** Sathaye, J.A. (University of California, Berkeley (USA)). *Energy Policy;* **15**: No. 4, 339-351(Aug 1987).

The government of the Phillippines is committed to reducing the country's dependence on imported oil. An element in its plan to accomplish this goal is the generation of electricity using indigenous energy sources - wood/biomass, hydro, geothermal and coal. Wood-fired generation in the Phillipines has drawn worldwide attention from other developing countries interested in embarking on similar programmes. This investigation reveals the difficulties inherent in implementing such a programme. Primary concerns include the institutional issues in the generation and distribution of power by the National Power Corporation (NPC), the National Electrification Administration (NEA), the rural electric cooperatives (RECs) and the tree farmer associations (TFAs), the influence of demand patterns on the financial viability of rural electric cooperatives, and the influence of low load factors, small size and remote locations on the cost of dendro thermal power plants. The conclusions should be of interest to other countries interested in pursuing similar programmes.

13 HYDRO ENERGY

1301 Resources And Availability

47273 **(NEI-DK—40) Hydrological hydropower exploration Iterlaa Paamiut/Frederikshaab. Hydrological dimensioning basis 1985.** (Groenlands Tekniske Organisation, Copenhagen (Denmark)). Jul 1986. 78p. (In Danish). NTIS (US Sales Only), PC A05/MF A01. File Number DE87753056.

For the future energy supply at Paamiut the Energy Plan for Greenland considers a utilization of the water power potential found in the Iterlaa basin situated 40 km north east of the town of Paamiut. In connection with the preparation of the projecting basis for a hydraulic power station at the Iterlaa basin, the present report comprises the establishment of the hydrological basis for the station, an evaluation of same, as well as reflections with regard to the basins's reservoir problems. A hydrological model simulation was performed and the synoptic data of the Meteorological Institue measured at Paamiut in the period from 1959 to 1985 have been included. A transfer of data from the hydrological simulation from Paamiut to the Iterlaa basin has however proved difficult, primarily on account of the length of the registration period, but also because there are apparently "big" climatic differences between town and basin. Consequently, the outcome of the model simulation is that the water balance during the period can be determined, but that the temporal distribution of the runoff measured over short periods does not agree with the measured values. In the light of the accomplised model simulation it is therefore a prerequisite that the existing hydrological basis must only be used as dimensioning basis for a hydraulic power station in Iterlaa basin, if recordings are made for at least one year. (EG).

47274 **(SV-UL-FUD-B—86-3) Measurement of efficiency in hydro power plants using ultrasonic measurement of total water flow position related echosounding - area measurement.** Deborg, J. (Swedish State Power Board, Aelvkarleby). 18 Feb 1986. 30p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753116.

The market has been scanned for instruments for precise measurements of river areas, and equipment fulfilling the requests made have been found. Methodology for these measurements is discussed. (L.E.).

1303 Plant Design And Operation

47275 **(DOE/ID—10158) DOE Small-Scale Hydropower Program: Annual report 1987.** Rinehart, B.N.; Chappell, J.R.; Sommers, G.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Aug 1987. Contract AC07-76ID01570. 151p. NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE88000106.

This report summarizes the research and development and technology transfer activities of the US Department of Energy's (DOE's) Small-Scale Hydropower Program for fiscal year 1986 and 1987, and provides an annotated bibliography of research, engineering, operations, regulations, and costs of projects pertinent to hydropower development. The bibliography discusses reports written by both private and non-Federal Government sectors. The Small-Scale Hydropower Program is reported in five sections: (1) Technology Development; (2) Engineering Research and Development; (3) Technology Transfer; (4) Environmental Research; (5) Legal and Institutional Aspects.

1305 Economics And Management

REFER ALSO TO CITATION(S) 47275

47276 **(NEI-DK—42) Introduction of a hypothetical ocean current power unit into the Faeroe Island energy system.** Kilde, N.A. (Risoe National Lab., Roskilde (Denmark)). Dec 1985. 32p. (In Danish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753060.

As part of a study for the Danish Ministry of Energy entitled: Potential possibilities for ocean-current power production, this report describes the introduction of a hypothetical ocean-current power unit into the Faroe Island energy system. The Faroe Islands were chosen as an example, because the combination of high tidal-current velocities and an expensive electricity structure -partly based on diesel production- gives a renewable energy source as tidal-current a more competitive position than perhaps anywhere else. The Faroe Islands energy system is described, the value of a potential production is estimated and some conditions for the fitting into the system are evaluated but it is not considered whether an ocean-current powerstation is economic or at all technical feasible. EFP-84; 3. report of the project "Potentials of using ocean currents for hydroelectric power plants"; 19 refs.

1306 Environmental Aspects

REFER ALSO TO CITATION(S) 48441

47277 **(DOE/BP/62381—1) A wildlife habitat protection, mitigation and enhancement plan for eight federal hydroelectric facilities in the Willamette River Basin: Final report.** Preston, S.K.; Noyes, J.H.; Potter, M.S. (Oregon Dept. of Fish and Wildlife, Portland (USA). Habitat Conservation Div.). Jul 1987. Contract AI79-86BP62381. 186p. NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE87013429.

The development and operation of eight federal hydroelectric projects in the Willamette River Basin impacted 30,776 acres of prime wildlife habitat. This study proposes mitigative measures for the losses to wildlife and wildlife habitat resulting from these projects, under the direction of the Columbia River Basin (CRB) Fish and Wildlife Program. The CRB Fish and Wildlife Program was adopted in 1982 by the Northwest Power Planning Council, pursuant to the Northwest Power Planning Act of 1980. The proposed mitigation plan is based on the findings of loss assessments completed in 1985, that used a modified Habitat Evaluation Procedure (HEP) to assess the extent of impact to wildlife and wildlife habitat, with 24 evaluation species. The vegetative structure of the impacted habitat was broken down into three components: big game winter range, riparian habitat and old-growth forest. The mitigation plan proposes implementation of the following, over a period of 20 years: (1) purchase of cut-over timber lands to mitigate, in the long-term, for big game winter range, and portions of the riparian habitat and old-growth forest (~ 20,000 acres); (2) purchase approximately 4,400 acres of riparian habitat along the Willamette River Greenway; and (3) three options to mitigate for the outstanding old-growth forest losses. Monitoring would be required in the early stages of the 100-year plan. The timber lands would be actively managed for elk and timber revenue could provide O & M costs over the long-term.

47278 (EPRI-EA—5202, pp 1.1-1.19) **Utilization of schedule outages to influence the structure of local fish stocks in the Lower Hudson Estuary.** Heimbuch, D.G. (Martin Marietta Environmental Systems, Columbia, MD). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

A systematic methodology is being developed for identifying feasible assessment levels of outage effectiveness, considering: available data, their applicability and constraints, and the costs, risk and benefits associated with modified or additional studies that may be necessary to make such assessments. Although this methodology is being developed and implemented to address the assessment of outage effectiveness, the general approach could be applied to other kinds of monitoring or research programs that require extensive field sampling. The methodology consists of seven steps: Definition of candidate assessment measures; Development of a general conceptual model of effects of mitigative actions on stocks; Development of algebraic formulae for each of the candidate assessment measures in terms of parameters represented in the conceptual model; Re-expression of algebraic formulae at levels of detail supportable by data from field sampling; Identification of alternate estimators for all parameters included in the algebraic formulae for assessment measures; Evaluation of historic field sampling programs for their adequacy in producing data required for the parameter estimators; and Characterization of the reliability and feasibility of each candidate assessment.

47279 (EPRI-EA—5202, pp 3.4-3.7) **Mitigation of power plant impacts on striped bass in the Sacramento-San Joaquin Estuary.** Chadwick, H.K. (California Dept. of Fish and Game, Stockton). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Pacific Gas and Electric Company operates two large power plants in the Sacramento-San Joaquin Estuary. The most important fishery resource in the estuary is striped bass. An extensive evaluation was made of the impacts of the power plants in 1978 and 1979, but despite substantial background data on the dynamics of striped bass in the estuary, no way was found to estimate the actual magnitude of compensatory changes in mortality rates. The California Department of Fish and Game contended that bass losses were unacceptable and a settlement was negotiated. The terms of the settlement are discussed and the artificial propagation program which was accepted as mitigation for the striped bass losses is described.

47280 (EPRI-EA—5202, pp 3.8-3.15) **Hudson River stocking program.** Kirk, W.L. (Consolidated Edison Co., New York, NY). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

The striped bass stock enhancement program that was imposed on the power industry as a mitigative settlement for postulated impacts is described. The program involves the use of hatcheries and a grow-out program as well as load scheduling manipulations to augment or protect natural production in the face of impacts.

47281 (EPRI-EA—5202, pp 3.16-3.22) **Hatchery and tank culture program for rearing striped bass.** Bauereis, E.I. (Baltimore Gas and Electric Co., Baltimore, MD). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

The striped bass has been designated at threatened species in Maryland waters. A moratorium on commercial and recreational taking and fishing for striped bass went into effect on January 1, 1985. This was the culmination of falling commercial catches and a consistently lower than average young-of-year index. In 1980, several years before the moratorium, Baltimore Gas and Electric Company had explored the potential for aquaculture using the waste heat generated by the condenser cooling system at the Charles P. Crane Station. It was determined that the Chesapeake Bay stock of striped bass were at a sufficiently low ebb that a pilot program to grow out fish to 50 mm in length for release was justified. Approval from Company management was secured in 1981 and a feasibility study was initiated at the Crane Station to define the most appropriate type and size of facility. Based on the findings of the feasibility study, an extensive hatchery and tank culture system with a flow capacity sufficient to support one million 50 mm fish was designed and constructed. This facility which became operational in March, 1983 is described. 3 references, 2 figures.

47282 (EPRI-EA—5202, pp 3.23-3.25) **Restoration of striped bass in the Patuxent River.** Bailey, D.E. (Potomac Electric Power Co., Washington, DC). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Commercial and sport harvests of striped bass along the north Atlantic coast and, especially, from the Chesapeake Bay have declined dramatically over the past decade. A number of states are attempting to work together to resolve these water quality problems. Maryland has taken the lead in this effort through development of new regulations a substantial commitment of state resources to improved water treatment and land management practices. This program is termed the Chesapeake Bay Initiative. The Patuxent River will serve as a major focus for this activity. A number of Program components focus on restoration of striped bass due to the historical, commercial and recreational importance of the species. The state has imposed a ban on all commercial and recreational harvest of this species and has proposed to continue the ban for the next four years. In addition, an active hatchery and release program is being developed. Potomac Electric Power Company's (PEPCO) Chalk Point Generating Station is located on the river. This facility uses a substantial volume of river water for condenser cooling. As a consequence, PEPCO felt that active participation in the striped bass restoration plan would be an ideal way to contribute to the success of the overall initiative.

47283 (EPRI-EA—5202, pp 6.1-6.21) **Coastal waters of the southwestern U.S.: the enhancement of local fish stocks by development of artificial reefs.** Grove, R.S. (Southern California Edison, Co., Rosemead). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Southern California Edison Company's research involving artificial reefs is seeking to identify the resource enhancement management options that reefs provide. Target function and target species, and design and siting considerations are being defined by the management of the Pendleton Artificial Reef, studies of natural reefs in southern California, and literature reviews of Japanese artificial fishing reef experiences. These projects have been ongoing for at least five years and have received an enthusiastic response from the scientific community, management and regulators. The outcome of this research is not complete and much quantitative information about artificial reefs is still needed before exact mitigative trade-offs can be discussed. 14 references, 4 figures, 3 tables.

47284 (EPRI-EA—5202, pp 7.1-7.9) **Production and stocking of fishes; observations concerning questions of potential interest to the power industry.** Lewis, W.M. (Southern Illinois Univ., Carbondale). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Stocking of fish offers the most immediate and apparent return for the fish management budget. Reestablishment of a favorite sport fish, or in some cases the introduction of a new sport fish,

can be of benefit in several ways. The economic and public relations values are generally accepted. Even more significant may be the potential ecological benefits that result. Natural fish communities are usually characterized by relatively high diversity. Diversity in a community is thought support stability of that community. In fish communities that have suffered disruption, it is often the top predators that have suffered most, and their absence encourages an abnormal abundance of some other component of the community, which may be both highly competitive as well as predaceous. Therefore, stocking of top predators can be used to maintain balance in fish communities. The power industry is often confronted with the dilemma of proving that the operation of a production facility does not result in environmental damage. Fish are often selected as indicator organisms.

47285 (EPRI-EA—5202, pp 2.1-2.17) **Background to a discussion of compensation.** Slobodkin, L.B. (State Univ. of New York, Stonybrook). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Comparison of physiological states in different times or between different species may permit some estimate of how much compensatory capacity is available in any particular species. In fact, even the variance between places may be of value in itself. The author doesn't think this has been investigated. If in all places the growth rate and fecundity of a particular species is essentially the same, he would believe that there is essentially no compensatory capacity in those populations. If the field values of growth and reproductive rates are as high as can be achieved under any circumstances, then he would believe that the population in nature is at present under predatory control. While there is no compensatory capacity, it may be possible to substitute for a predator in some way, thereby slipping into the system without doing too much damage. If, on the other hand, the natural values for growth and reproduction are considerably lower than can be achieved in the laboratory, it might be interpreted to mean that the compensatory value available in nature is really very high and that the organisms are uniformly and persistently resources limited. A partial conclusion is that the rearing of organisms in nature as individuals or in natural experiments can, along with measurements of reproductive and growth rates in the field, in determining the probability of compensatory effect.

47286 (EPRI-EA—5202, pp 3.1-3.8) **Compensation in exploited fish populations.** Saila, S.B. (Univ. of Rhode Island, Kingston). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Some fish and aquatic invertebrate populations have been subjected to significant levels of exploitation for centuries without apparent collapse or even large changes in sustained yields. Other populations (about 20 major commercially-exploited fish species) have suffered temporary collapses which have been attributed to either over-exploitation and/or environmental changes. However, no major commercial species has been exploited to extinction. To be successfully harvested on a sustained basis, any population must be subject to density-dependent regulation. Indeed, practical management schemes for exploited fish populations are based on optimizing the yield from surplus production. The assumption of surplus production implies that the number of spawning adults and eggs produced is not limiting and that a given recruitment level is the result of density-dependent growth and mortality, and their modification by density-dependent factors.

47287 (EPRI-EA—5202, pp 4.1-4.15) **Functional groups and the search for compensatory mechanisms in the population dynamics of North American fresh water fishes.** Kaufman, L.S. (Harvard Univ., Brookline, MA). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

An attempt is made to come to terms with the chronic effects of aquatic heat disposal on fish populations, so that the authors can ensure the survival of important species. To evaluate the characteristics and needs of each potentially impacted species would be a task of formidable magnitude. Clearly, it would be advantageous to learn the patterns of similarities and differences among these myriad species, so that they can group and extrapolate from one species to another when important decisions are to be made. A grouping of fish species according to their susceptibilities and strengths in the face of prolonged power plant impacts would provide a systematic way to guess at the basic requirements for poorly known species. It could help to predict if a species is adaptable enough to yield to the demands of new surroundings, or if, on the other hand, its only hope would lay in their catering to its rigid needs. Criteria are discussed that have been used to compare fishes to each other along functional gradients, or to collect fishes into functional groups. They must be cautious, however, in using functional groups, for the structure, function and behavior of fishes can be highly labile. Fishes defy any rigid ecological categorization.

47288 (EPRI-EA—5202, pp 5.1-5.34) **Decisive events in the early life history of fishes and the pertinence of such events to the functional groups of fishes according to the their susceptibility to their susceptibility to impact.** Balon, E.K. (Univ. of Guelph, Ontario). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Attention is focused on identifying the most critical intervals in the early life history of fishes. Not only will the groups of various phenotypes differ in their susceptibility to impact, but there will be several decisive events in their life histories which may be more important in that respect, or at least warrant equal attention. Organisms will be less susceptible in homeostatic states than in unstable thresholds. If the authors can identify these thresholds they will know what to look for in determining causes of mortalities. They document the need for a model of life history based on the comparison of ontogenesis and challenges some commonly held beliefs pertaining to major boundaries of early ontogeny. 113 references, 7 figures, 2 tables.

47289 (EPRI-EA—5202, pp 6.1-6.19) **Gene diversity in fish populations: research considerations for EPRI.** Powers, D.A. (Johns Hopkins Univ., Baltimore, MD). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

When faced with environmental stress, organisms will survive or fail as a consequence of physiological and/or genetic plasticity. While physiological adaptation is ultimately genetic, the authors can operationally distinguish between these two adaptive modes for pragmatic reasons. Physiological adaptation is considered a result of a scope for individual effort and genetic adaptation, a result of species or population plasticity. Physiological adaptation is accomplished by adjusting behavior, organ-system dynamics, molecular components and a host of other constituents at the individual level; a genetic adaptation is accomplished by reshuffling the gene pool of populations. Since many electric power generating plants are located on the edge of aquatic habitats, there are activities that are necessary for the functioning of these plants that may stress fish populations and, thus, contribute to the reshuffling of gene pools and even genetic erosion of resident populations. Within limitations, there are mechanisms that may be employed by populations to conserve their genetic integrity. However, if these limitations are exceeded, the erosion of gene diversity will follow. The purpose of this paper is to address both the mechanisms of genetic adaptation and the consequence of failing to adapt. 40 references, 1 figure, 6 tables.

47290 (EPRI-EA—5202, pp 7.1-7.8) **Individual fish's response to changes in population density.** Gerking, S.D. (Arizona State Univ., Tempe). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Possible responses of individual fish to changing population density are described. In some respects, the individual response mirrors the population response simply because the population is made up of a number of individuals. However, there are differences between the organismal and population levels of organization that might be meaningful in interpreting population regulation mechanisms. A considerable lag exists between the time when responses are elicited at the organismal level and the time when they show up at the population level. Knowing the individual response will help anticipate how the population parameters will change a year or more into the future. Under deteriorating environmental conditions, population analysis assesses the damage after it is done. Population size at any moment in time is governed by a balance among rate functions such as mortality rates, natality rates, and production rates (in relation to time). These rates, however, are collective expressions of the individual organism's ability to grow, reproduce, acquire food, excrete, metabolize, maintain electrolyte balance and coordinate all of these life functions under a given set of environmental conditions.

47291 (EPRI-EA—5202, pp 8.1-8.12) **Importance of an improved understanding of compensatory mechanisms in fish populations: an industry perspective.** Howe, P.H. (Commonwealth Edison Co., Chicago, IL). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Utilities have become familiar with the concept of compensation in fish populations because of concerns related to impingement and entrainment for existing and proposed steam electric generating stations. Both legislation and concerns by environmental activists in the last 15 years have resulted in utilities incorporating the concept to justify existing and proposed intakes and open-cycle cooling. A brief summary is presented of a few major environmental cases and legislation which require utilities to consider compensation and the various approaches, directed primarily by economic considerations, that utilities have used to address this issue. Costs of various technological alternatives are presented as well as the savings associated with demonstrating that minimum technology, in terms of intakes and open-cycle cooling, is environmentally acceptable by using the argument of compensation and lack of impact as determined by monitoring. Finally, the major problem with monitoring programs, namely the inability to measure a population change, is addressed. 9 references, 4 tables.

47292 (EPRI-EA—5202, pp 2.1-2.7) **Potential environmental issues for the application of research on compensatory mechanisms of fishes - the EPRI perspective.** Brocksen, R.W. (Univ. of Wyoming, Laramie). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

The following two topics are discussed: (1) the time-sequence of development of interest in compensatory mechanisms of fish populations at the Electric Power Research Institute; and (2) the opportunities for evaluation and application of research results relevant to power plant impacts in addition to the commonly perceived key issues of entrainment and impingement. Both topics have pertinence to the overall EPRI planning program and, especially, the considerations of this working group. Hopefully, this presentation will serve to expand the potential relevance of results from a generically-defined program of research on fish population dynamics to a broader spectrum of existing and postulated environmental issues. 8 references.

47293 (EPRI-EA—5202, pp 3.1-3.6) **Compensation in fish populations: research applications - the Florida Power & Light Company perspective.** Wilcox, J.R. (Florida Power & Light Company, Juno Beach). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

The Florida Power and Light Company has not had to squarely face the issue of compensation as an offset of fish mortalities at any of its facilities. Most of the issues were related to thermal components instead of entrainment and impingement. The issue identified in relation to fish populations at four of the facilities are presented. 4 references.

47294 (EPRI-EA—5202, pp 4.1-4.14) **Fish impingement at Ontario Hydro's generating stations.** Patrick, P.H.; Hester, R.A.; Wiancko, P.; Christie, A.E. (Ontario Hydro, Toronto). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

Ontario Hydro is a Crown corporation. It operates a variety of types and sizes of generating facilities and, at present, produces over 20,000 MWe of electrical energy for the Province of Ontario. The authors review will deal specifically with fish impingement at Ontario Hydro's fossil-fired and nuclear facilities located on the Great Lakes as an example of the types of fisheries-related problems faced by the Company and the types of regulatory interactions with which they must contend in the process of obtaining adequate condenser cooling water. A general overview of each physical plant will be presented including system capacity, cooling-water source, and the fish impingement experience at that site. Information also will be presented on their fish impingement research program, and some rationale given on why information on regulatory mechanisms that determine the size and structure of impacted fish populations would be useful. Ontario Hydro has conducted no research to date on the question of natural compensation in fish populations. 24 references, 2 figures, 3 tables.

14 SOLAR ENERGY

1401 Resources And Availability

47295 **(SERI/PR—215-3098) HBCU [Historically Black Colleges and Universities] solar radiation network annual report: FY 1986.** Stoffel, T.L. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1987. Contract AC02-83CH10093. 34p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87012271.

This report summarizes the development of the Historically Black Colleges and Universities (HBCU) Solar Radiation Network through fiscal year 1986. In operation since November 1985, the six-station network provides 5-minute averaged measurements of global ad diffuse horizontal solar irradiance that are processed at the Solar Energy Research Institute (SERI) to improve the assessment of the solar radiation resource in the southeastern United States. One of the stations also measures the direct-normal solar irradiance with a pyrheliometer mounted in an automatic sun tracker. The report also describes the HBCU project's technology transfer goals, which involve the dissemination of solar resource information, the establishment of academic research programs in solar energy, and the summer student and visiting faculty programs at SERI.

47296 **(SERI/TR—215-3087) A quasi-physical model for converting hourly global horizontal to direct normal insolation.** Maxwell, E.L. (Solar Energy Research Inst., Golden, CO (USA)). Aug 1987. Contract AC02-83CH10093. 67p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87012273.

Numerous research studies have shown that the use of a single regression function does not adequately characterize the relationship between direct beam transmittance (Kn) and the effective global horizontal transmittance (Kt). Therefore, the Direct Insolation Simulation Code (DISC) employs an exponential relationship between ΔKn and air mass which is parametric in Kt. This algorithm seems to provide a satisfactory Kn-Kt relationship for a wide range of stations and seasons. Validation of the DISC Model was accomplished with data from three widely separated stations (Albuquerque, Bismarck, and Brownsville) which were not used for model development. Comparisons with the ETMY model (used to generate direct normal data for 222 of the 248 stations in the national data base) showed substantial improvements in the accuracy of hourly values, significant reductions in monthly RMS errors, and equivalent monthly mean bias errors. Furthermore, modification of the DISC model to incorporate cloud-cover, water vapor, and albedo terms appears to be straightforward.

47297 **Method and apparatus for measuring solar radiation in a vegetative canopy.** Gutschick, V.P.; Barron, M.H.; Waechter, D.A.; Wolf, M.A. (to Dept. of Energy, Washington, DC). US Patent 4,678,330. 7 Jul 1987. Filed date 30 Apr 1985. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

An apparatus is described for measuring solar radiation received in a vegetative canopy, the apparatus comprising: a. sensors for selectively generating an electrical signal in response to impinging photosynthetically active radiation in sunlight. Each of the sensors is insensitive to infrared radiation and is attached to an upper surface of a plant within the vegetative canopy. Each of the sensors is sufficiently lightweight to permit substantially normal plant movement; b. a junction box having ports, each of the sensors electrically connected to a different one of the ports; c. operational amplifiers for amplifying the electrical signals generated by the sensors, each of the ports being electrically connected to a different one of the operational amplifiers; d. analog-to-digital convertors for digitizing the electrical signals, each of the analog-to-digital convertors being electrically connected to a different one of the operational amplifiers; e. a computer operatively connected to the analog-to-digital convertors for accumulating and storing solar radiation data; and f. data output means for displaying the solar radiation data, the data output means operatively connected to the computer.

1405 Solar Energy Conversion

REFER ALSO TO CITATION(S) 47265, 47267, 47297, 47351, 47701

47298 **(AD-A—182589/2/XAB) Computer modeling of high-voltage solar array experiment using the NASCAP/LEO (NASA Charging Analyzer Program/Low Earth Orbit) computer code. Master's thesis.** Reichl, K.O. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Jun 1987. 211p. (AFIT/GE/ENG—87J-2). NTIS, PC A10/MF A01.

This thesis predicted interactions between the Interactions Measurement Payload for Shuttle (IMPS) flight experiment and the low-earth-orbit plasma environment. Two interactions (parasitic current loss and electrostatic discharge on the array) may be detrimental to mission effectiveness. They result from the spacecraft's electrical potentials floating relative to plasma ground to achieve a charge-flow equilibrium into the spacecraft. The floating potentials were driven by external biases applied to a solar array module of the Photovoltaic Array Space Power (PASP) experiment aboard the IMPS test pallet. The modeling was performed using the NASA Charging Analyzer Program/Low Earth Orbit (NASCAP/LEO) computer code which calculates the potentials and current collection of high-voltage objects in low earth orbit. Models are developed by specifying the spacecraft, environment, and orbital parameters. Eight IMPS models were developed by varying the array's bias voltage and altering its orientation relative to its motion. The code modeled a typical low earth equatorial orbit. NASCAP/LEO calculated a wide variety of possible floating potential and current collection scenarios. These varied directly with both the array bias voltage and with the vehicle's orbital orientation.

47299 **(BLS—6423) Gallium arsenide solar arrays for applications in geostationary orbit. Final report.** Haywood, D.H.; Howard, J. (Marconi Space and Defence Systems Ltd., Hilland (UK)). May 1986. 104p. (ESA-CR(P)—2299; ETN—87-99863). NTIS, PC A06/MF A01.

A planar trough concentrator (PTC) and Cassegrain concentrator for GaAs solar arrays were compared, showing the feasibility of the PTC. Comparison with straight planar arrays shows that the PTC gives a 10% mass saving, and 40% area reduction, over a GaAs planar as well as a 40% reduction in quantity of cells required, making the GaAs PTC a worthwhile contender for geostationary satellites similar to OLYMPUS. Although the Cassegrain concentrator appears disadvantageous against planar GaAs in terms of mass and area, the saving in cells of 75% and in actual bulk cell material of 98.5% gives the Cassegrain a large cost advantage. The large number of 2 x 2 cm GaAs cells required is considered beyond present supply capability for the planar solution. Therefore the Cassegrain concentrator is considered advantageous for large LEO spacecraft especially if annealing can be perfected.

47300 **(ENEA-RT/FARE—85/8) Apparatus for thermophotovoltaic conversion.** Bellone, S.; Caruso, A.; Cocorullo, G.; Piro, G.; Prezioso, V.; Spirito, P.; Vitale, G. (Naples Univ. (Italy)). 1985. 141p. (In Italian). NTIS (US Sales Only), PC A07/MF A01. File Number DE87900988.

The feasibility of Germanium cells for thermophotovoltaic application is verified. On that account it has been studied that the cell behavior in tandem systems with blackbody thermal radiation sources have temperatures and power densities up to 2500°K and 22 W/cm² respectively. Furthermore the fabrication process of a Germanium cell has been developed, including the preparation of semiconductor surfaces, diffusion of thin layers, fabrication of ohmic contacts with low contact resistivity on the front of the cell and ohmic contacts on the back with effective BSF. The geometry of the front contact has also been studied and an analytical model has been developed that gives the correlation between the performance of the cell and its physical and geometrical parameters. Conversion efficiencies higher than 16% has been found without taking into account the reflection losses.

47301 **(KTM/E—D-127) Biomass conversion technical information service.** Alakangas, E. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). Mar 1986. 38p. (In Finnish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753334.

The principal objective of the International Energy Agency's (IEA) Biomass Conversion Technical Information Service (BCTIS) is the collection and dissemination of information relating to all aspects of biomass energy including cultivation, harvesting, materials handling, conversion techniques and environmental and economic aspects. The BCTIS-project has 13 member countries. Finland became a Contracting Party in 1981. Finland is acting through Technical Research Centre of Finland. The Service publishes a bimonthly abstracts bulletin "Biomass Abstracts". In addition, the Service publishes Retrospective Literature Searches on specific biomass topics annually. From the beginning of 1986 online searching is available from Scientic Technical Information Network (STN International). Fachinformationzentrum Energie, Physik und Mathematik GmbH has producted BIOMASS-database. The BIOMASS-data is in tentative use for two years. Finland has actively developed the Service by presenting two proposal documents concerning online version of Biomass Abstracts, a more detailed list of contents and coverage to every number of abstract bulleting and the access to original documents. IEA committee has been discussing future IEA Information Policy during 1986. There were being discussed (with the IEA) the US Deparatment of Energy could provide a central technical data base, Energy Technology Data base (ETDB). One of the various options is that BCTIS could form a part of ETDB. No final decissions had been made.

47302 **(SAND—87-2184C) Mechanically stacked multijunction solar cells: An update on Sandia programs.** Gee, J.M.; King, D.L. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 5p. (CONF-871112—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014641.

From 3. international photovoltaic science and engineering conference; Tokyo, Japan (3 Nov 1987).

Recent progress in a program managed by Sandia National Laboratories for development of mechanically stacked, multijunction (MSMJ) solar cells is reported. The goal of the program is to develop a 2-junction, 4-terminal tandem concentrator cell with an efficiency of 30%. Two MSMJ cells are under development. The first MSMJ cell consists of a wide-bandgap cell stacked on top of a silicon solar cell. The second MSMJ cell consists of a GaAs cell stacked on top of a narrow-bandgap solar cell. The best MSMJ cell demonstrated to date is a GaAs/silicon MSMJ concentrator cell that achieved an efficiency of 26.6% at 100 suns. 15 refs., 3 figs., 2 tabs.

47303 **(SNV—3085) Environmental effects of energy crops cultivation.** Bjoerkhem, G.; Fogelfors, H. (National Swedish Environmental Protection Board, Solna; Statens Energiverk, Stockholm (Sweden)). Jul 1986. 103p. (In Swedish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753347.

The production of fuel crops implies risks for further environmental loads on the agrarian ecosystem. This primarily applies to problems involving crop rotations, chemical pesticides, nitrogen leaching and changes to the humus content. Fuel crops will be growing largely on farms which are already specialized in producing these crops for food purpose. Thus, the positive crop rotation effects which could be obtained through increased diversity in the one-side cereal production frequently found in Swedish plainland farming, would most probably result in increasing rotation problems, i.e., problems which are mainly caused by the plant pathological situation and which often lead to an increased use of pesticides. In addition, great demands are placed on quantitative production, whereas for food production important quality demands are frequently on lower levels. This may also lead to increased instability and decreased safety margins with regard to ecological effects. On the whole, the, processing and use of agricultural crops for energy purpose need hardly imply increased levels of pollution when replacing fossil fuels. The important environmental gains which would be achieved foremost concern reduced discharges of carbon dioxide, sulphur compounds and lead. Many environmental loads which occur during the processing and utilization of fuel crops could be reduced and controlled by relatively simple measures. (authors).

47304 **(STEV-KOL—87-3) Hydroprocessing at CTH. 266028-2 Stage 2.** Gevert, B. (Statens Energiverk, Stockholm (Sweden)). Feb 1987. 142p. (In Swedish and English). NTIS (US Sales Only), PC A07. File Number DE87753360.

Directly liquefied biomass (by the PERC process) has been upgraded to gasoline and diesel by the following steps: - Extraction with decahydrohaphtalen, simulating extraction with gasoil. - Hydroprocessing of the extracted oil with a sulphided catalyst. - Distillation and catalytic cracking of the hydroprocessed oil. The yields of gasoline and diesel are 9.9 and 16.5 weight percent respectively of fed liquefied biomass. The process is not optimized. Methylsubstituted phenols present in the liquefied biomass have been hydroprocessed to eliminate the oxygen content. The reaction may either be a direct elimination of oxygen or an elimination preceeded by hydrogenation which consumes large amounts of hydrogen. By running the reaction in an environment with a low sulphur content and with a sulphided catalyst, it is possible to carry out direct hydrodeoxygenation. During the two year period, results have been achieved according to the proposed program.

47305 **(TFB—1986:1) Transport of solid fuels.** Ehrning, U.; Ringsberg, K. (Swedish Transport Research Board, Stockholm). Nov 1985. 121p. (In Swedish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753349.

The report presents the result of a study of possibilities and conditions for designing rational transport systems for solid fuels with the exception of coal. Possibilities, methods and equipment are presented as well as experience that has been made. Directions for further R and D within the field of solid fuels are proposed. (authors).

47306 **Kinetic studies of the annealing behavior of a-Si:H p-i-n solar cells.** Bennett, M.S.; Newton, J.L.; Rajan, K.; Rothwarf, A. (Solarex Corporation, 826 Newtown-Yardley Road, Newtown, Pennsylvania 18940). *Journal of Applied Physics;* **62**: No. 9, 3968-3975(1 Nov 1987).

Results of measurements of the annealing of photodegraded amorphous silicon p-i-n solar cells are presented. The annealing process can be characterized by a relatively fast initial stage followed by a much slower second stage. Although the annealing behavior cannot be described by simple exponential kinetics, it can be characterized by a single activation energy of 1.2 eV. The degradation temperature and the duration of the light soaking do not affect this activation energy, although the ratio of the "fast" to the "slow" portions of the recovery change as these experimental parameters are varied. We have explained these phenomena in terms of hydrogen motion in the material.

47307 **Electric field and infrared-induced recovery of metastability in amorphous hydrogenated silicon.** Bhattacharya, E.; Pankove, J.I.; Deb, S.K. (Solar Energy Research Institute, Golden, Colorado 80401). *Applied Physics Letters;* **51**: No. 13, 998-1000(28 Sep 1987).

In this letter we investigate the difference between the bond breaking and the charge trapping model of the light-induced effect in amorphous hydrogenated silicon (a-Si:H). We also report the partial recovery from the light-induced effect in p-i-n solar cells by infrared illumination in the presence of an electric field.

47308 **Organic matter and nutrients associated with fine root turnover in a white oak stand.** Joslin, J.D.; Henderson, G.S. *Forest Science;* **33**: No. 2, 330-346(Jun 1987).

Organic matter and nutrients cycled by fine root turnover were quantified in a mature white oak (Quercus alba L.) stand and compared to contributions from litterfall. The budget method, a revised version of the traditional repeated sampling method, was used to measure root turnover. The magnitude of the live and dead pools of three size classes of fine (<5 mm diameter) roots were monitored bimonthly for 14 months. Decomposition rates over these intervals were also measured, while production and mortality were calculated. Litterfall was collected simultaneously, and the nutrient concentrations of the various detritus components determined. Root pools fluctuated less, and total root turnover biomass (220 g m^{-2} yr^{-1}) was also less than previously noted in most other stands studied. Fine root turnover accounted for 30% of the total detritus production and 20-40% of the turnover of the five macronutrients (N, P, K, Ca, Mg) studied. Differences with previous studies suggest that there may be rather large species and/or site-related differences in the amount of energy various stands allocate for fine root maintenance. For. Sci. 33(2):330-346.

1406 Photovoltaic Power Systems

47309 **(N—87-23901) Issues in space photovoltaic research and technology.** Flood, D.J. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). May 1987. 16p. (NASA-TM—89922; E—3620; NAS—1.15:89922; CONF-870528—20). NTIS, PC A02/MF A01.

From 19. IEEE photovoltaic specialists conference; New Orleans, LA, USA (4 May 1987).

Key issues and opportunities in space photovoltaic research and technology are addressed relative to future NASA mission requirements and drivers. Examples are given of future space missions and/or operational capabilities that are on NASA's planning horizon presenting major tachnology challenges to the use of photovoltaic power generation in space. A brief description of the capabilities ascribed to the competing technologies of nuclear and solar thermal power systems are given. The performance goals that space photovoltaic power systems must meet to remain competitive are described.

47310 **(N—87-24531) Development of an advanced photovoltaic concentrator system for space applications.** Piszczor, M.F. Jr.; Oneill, M.J. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1987. 16p. (NASA-TM—100101; E—3637; NAS—1.15:100101; AIAA—87-9034). NTIS, PC A02/MF A01.

Recent studies indicate that significant increases in system performance (increased efficiency and reduced system mass) are possible for high power space based systems by incorporating technological developments with photovoltaic power systems. The Advanced Photovoltaic Concentrator Program is an effort to take advantage of recent advancements in refractive optical elements. By using a domed Fresnel lens concentrator and a prismatic cell cover, to eliminate metallization losses, dramatic reductions in the required area and mass over current space photovoltaic systems are possible. The advanced concentrator concept also has significant advantages when compared to solar dynamic Organic Rankine Cycle power systems in Low Earth Orbit applications where energy storage is required. The program is currently involved in the selection of a material for the optical element that will survive the space environment and a demonstration of the system performance of the panel design.

47311 **(SV-UL-FUD-B—86-17) Energy output and efficiency of two grid connected PV-plants in a northern climate.** Brunstroem, C.; Andersson, M.; Hedstroem, J. (Swedish State Power Board, Aelvkarleby). 2 Jun 1986. 9p. (CONF-860874—3). NTIS (US Sales Only), PC A02/MF A01. File Number DE87753120.

From 2. international photovoltaic science and engineering conference; Beijing, China (19 Aug 1986).

The object of the project was to determine the energy production potential for photovoltaics in Sweden and to identify major system loss mechanisms. Performance parameters of two gridconnected PV-plants were intensively measured during the summer of 1985. The performance of each plant was compared with the other and combined with results from long-term measurements of climate characteristics. Annual AC efficiencies of 4.8 per cent and 9.0 per cent for the two plants were obtained. The large difference is mainly explained by different characteristics of modules and power conditioners. One inverter, which was not designed for the actual low power levels, is responsible for a total loss of 31 per cent while the corresponding value for the other inverter is 15 per cent. About 50 per cent of the global irradiation in Sweden originates from periods at an irradiance below 500 W per m/sb2/. Different low irradiance characteristics of modules and inverters between the two plants, therefore, significantly influenced the output. (authors).

47312 **(SV-UL-FUD-B—1986-18) Performance comparison between two grid-connected PV-plants.** Brunstroem, C.; Andersson, M.; Hedstroem, J. (Swedish State Power Board, Aelvkarleby). 20 Nov 1986. 7p. (CONF-861021—2). NTIS (US Sales Only), PC A02/MF A01. File Number DE87753121.

From 7. European photovoltaic solar energy conference; Sevilla, Spain (27 Oct 1986).

The object of the project was to determine the energy production potential for photovoltaics in Sweden and to identify major system loss mechanisms. Performance parameters of two grid-connected PV-plants was compared with the other and combined with results from long-term measurements of climate characteristics. Annual AC efficiencies of 4.8 per cent and 9.0 per cent for the two plants were estimated. The large difference is mainly explained by different characteristics of modules and power conditioners. One inverter, which was not designed for the actual low power levels, is responsible for an annual loss close to 30 per cent while the corresponding value for the other inverter is 15 per cent. About 45 per cent of the global irradiation in Sweden originates from periods at an irradiance below 500 W per m/sb2/. Different low irradiance characteristics of modules and inverters between the two plants, therefore, significantly influenced the output. (authors).

1407 Solar Thermal Power Systems

REFER ALSO TO CITATION(S) 47309

47313 **(N—87-24026) Fluoride salts and container materials for thermal energy storage applications in the temperature range 973 to 1400 K.** Misra, A.K.; Whittenberger, J.D. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1987. 23p. (NASA-TM—89913; E—3563; NAS—1.15:89913; AIAA—87-9226; CONF-870804—39). NTIS, PC A02/MF A01.

From 22. intersociety energy conversion engineering conference; Philadelphia, PA, USA (10 Aug 1987).

Multicomponent fluoride salt mixtures were characterized for use as latent heat of fusion heat storage materials in advanced solar dynamic space power systems with operating temperatures in the range of 973 to 1400 K. The melting points and eutectic composition for many systems with published phase diagrams were verified, and several new eutectic compositions were identified. Additionally, the heats of fusion of several binary and ternary eutectics and congruently melting intermediate compounds were measured by differential scanning calorimetry. The extent of corrosion of various metals by fluoride melts was estimated from thermodynamic considerations, and equilibrium conditions inside a containment vessel were calculated as functions of the initial moisture content of the salt and free volume above the molten salt. Preliminary experimental data on the corrosion of commercial, high-temperature alloys in LiF-19.5CaF_2 and NaF-27CaF_2-36MgF_2 melts are presented and compared to the thermodynamic predictions.

47314 **(SAND—87-0852) An evaluation of the LEC-460 solar collector.** Strachan, J.W. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1987. Contract AC04-76DP00789. 23p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000052.

The optical performance of the LaJet Energy Corporation's membrane faceted concentrator, Model LEC-460, was evaluated at Sandia National Laboratories, Albuquerque, using a fluxmapper, a device that measures flux intensity in the aperture plane of the collector with a movable Kendall radiometer. Three-dimensional flux intensity plots and flux contour maps were produced from the data, and numerical integration of the data was performed to obtain an estimate of the total integrated power into the aperture plane. The test results, normalized to a reference insolation value of 0.1 W/cm^2, indicated a peak flux of 172 W/cm^2 and a total integrated power of 30.2 kW. The net efficiency of the collector in a clean mirror condition was estimated to be 77.4%.

47315 **(SAND—87-1241C) Application of solar technology to fuel production chemical processing, and thermochemical energy transport: Status and future.** Fish, J.D. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 13p. (CONF-870903—1). NTIS, PC A02/MF A01; GPO Dep. File Number DE87014172.

From International Solar Energy Society international congress on solar energy; Hamburg, F.R. Germany (13 Sep 1987).

The status of investigations into the application of solar thermal technology to fuel production, chemical processes, and thermochemical energy transport and storage in several countries around the world is discussed. In addition, the concept of a direct catalytic absorption receiver (DCAR) and the potential role this concept may play in the future of solar fuels and chemicals are presented.

47316 **(SERI/TR—253-3025) The formation of optical membrane reflector surfaces using uniform pressure loading.** Murphy, L.M.; Tuan, C. (Solar Energy Research Inst., Golden, CO (USA); Nebraska Univ., Lincoln (USA)). Aug 1987. Contract AC02-83CH10093. 54p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87012275.

Potentially high quality optical reflector surfaces are attainable with the use of pressure formed membranes. Such reflector surfaces offer the prospect of very low weight and low cost. The formation of such surfaces, using initially flat circular membranes with uniform pressure loading, is studied in this paper. Finite axisymmetric deformations, along with both linear and nonlinear mate-

rial response is considered. A wide range of focal-length-to-diameter ratios (above 0.6) are addressed and the structural/optical response mechanisms that lead to optical distortions relative to ideal parabolic reflector shapes are also considered. Results show that elastic material response can often lead to a significantly larger deviation from the ideal shape than will inelastic material response. This results primarily from the ability to limit stress nonuniformities when inelastic material response is operative. Furthermore, when under pressure loading the membrane focal length decreases monotonically with increasing radius for both linear and nonlinear material response. Further, the predicted focal length variation is increasingly nonlinear near the membrane support.

47317 (SERI/TR—253-3162) Direct absorption receiver (DAR) systems assessment. Anderson, J.V.; Short, W.; Wendelin, T.; Weaver, N. (Solar Energy Research Inst., Golden, CO (USA)). Aug 1987. Contract AC02-83CH10093. 50p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87012277.

The direct absorption receiver (DAR) represents a fairly significant departure from conventional salt-in-tube receiver technology and appears to offer substantial promise for future generations of receivers. The DAR concept involves absorbing the solar flux directly into a film of molten salt that flows in a thin film over a plate. Since the film absorbs most or all of the flux directly, the flux limits associated with tubular receivers can be relaxed substantially. This allows smaller and lighter receivers, which results in better thermal performance and lower capital costs. This report describes the results of an effort to analyze the effects of these factors on system performance and energy cost for both cavity type and external DAR configurations. The approach taken is to directly compare a central system with a DAR receiver and the same system with a salt-in-tube receiver. The results show about a 16% improvement in the thermal performance (annual energy delivered) of a cavity DAR system, while the cost estimate for the DAR indicates a reduction of over 50% in the cost of the receiver. These two effects combine to produce about an 18% reduction in the levelized cost of delivered energy when compared to a system with a conventional salt-in-tube receiver.

1409 Solar Thermal Utilization

REFER ALSO TO CITATION(S) 47648

47318 (AD-A—182306/1/XAB) Study of the use of Y_2O_3 doped ZrO_2 membranes for solar electrothermal and solar thermal separations. Technical report. Parks, D.J.; Scholl, K.L.; Fletcher, E.A. (Minnesota Univ., Minneapolis (USA). Dept. of Mechanical Engineering). 6 Jul 1987. 51p. (TR—8). NTIS, PC A04/MF A01.

The authors measured ion- and (implicitly) electron-hole conductivities and O_2 semipermeabilities and their activation energies of commercial slip-cast Y_2O_3 doped ZrO_2 under conditions simulating their practical application. They believe it shows promise as an O_2 semipermeable membrane for ROC and electro-ROC type water splitters as well as components of devices for the gas-phase electrolytic separation of metals, Zn in this study, from their oxides.

47319 (DTH-LV-MEDD—179) Investigation of passive solar walls by means of an indoor test facility. Paludan-Mueller, C. (Danmarks Tekniske Hoejskole, Lyngby. Lab. for Varmeisolering). Apr 1987. 300p. (In Danish). NTIS (US Sales Only), PC A13/MF A01. File Number DE87753059.

The report describes an experimental and theoretical work concerning passive solar walls that has been carried out at the Thermal Insulation Laboratory. The main subject of the work is the measuring of solar walls by means of an indoor test facility, that has been constructed at the laboratory. The solar wall is installed in an insulated frame, and a "hot box" is placed on the inner side of the wall. The hot box provides well defined indoor conditions and the heat flow to or from the solar wall can be accurately determined. In case of measurements with collection of solar energy a solar simulator is used. In cases without solar radiation a "cold box" is placed in front of the solar wall. In the cold box outdoor climate conditions with low ambient temperature is created. Indoor test procedures have been practised for three different kinds of solar walls. The results from the measurements show whether the walls work as intended, and they are used for the validation of models. The model is fit into a computer programme by which it is possible to calculate the annual performance of the actual solar wall and other points of interest. Also the influence of changing different parameters concerning the wall is investigated by means of the programme. Finally the results from some measurements and calculations concerning solar walls with heat storage in phase change materials are reported. 60 refs.

47320 (ETEC—87-6) Measured piping and component heat losses from a typical SFBP [Solar in Federal Buildings Program] solar system. Francetic, J.S.; Robinson, K.S. (Rockwell International Corp., Canoga Park, CA (USA). Energy Technology Engineering Center). Jul 1987. Contract AC03-76SF00700. 157p. NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE87014594.

Recent comprehensive monitoring of solar energy systems has indicated that heat losses from system piping and components are much higher than originally expected. Theoretical analyses conducted at the Energy Technology Engineering Center (ETEC) predict that operating plus standby (during shutdown) heat losses from a typical solar system could equal up to one-third of the total gross solar energy collected by the system. Detailed heat loss experiments were conducted on a Solar in Federal Buildings Program (SFBP)-monitored site to identify and quantify actual piping, component, and thermosiphon heat losses for a typical day. The selected solar system, SFBP 4008, is a solar space heating and domestic hot water (DHW) system located at the Eisenhower Memorial Museum at Abilene, Kansas. The system has 4200 ft^2 of collector array located at a considerable distance from the mechanical building. Long lengths of exterior above-ground and buried piping connect the collectors to the mechanical room. Valves and pumps are uninsulated. The heat loss experiments at the Eisenhower site showed that 25% of the energy collected on a summer day was lost in pipes and components. Detailed results are given. 8 refs., 64 figs., 17 tabs.

47321 (SBI-R—182) Windows as energy-collectors. Relationship between energy consumption area and orientation of windows in a housing estate. Kjaer, A.; Pedersen, T. (Statens Byggeforskningsinstitut, Hoersholm (Denmark)). 1986. 48p. (In Danish). Statens Byggeforskningsinstitut, Postboks 119, DK-1970 Hoersholm.

The purpose of the project was to investigate whether, as normally assumed, houses with a larger window area than corresponding to Building Code Requirements had a larger energy consumption when the occupants' use of the houses was taken into consideration. It was also investigated whether there was any difference in the energy consumption of identical houses with windows oriented north-south and east-west. The investigation showed that the houses with windows facing east-west used less thermal energy than those oriented north-south: about 10 per cent on an annual basis, although about 20 per cent for January. (EG).

47322 (SERI/PR—254-3081) Effects of exposure testing on pipe insulation: FY 1986, progress report. Bingham, C.E.; Farrington, R.B. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1986. Contract AC02-83CH10093. 50p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87012274.

Researchers ran American Society for Testing and Materials (ASTM) C335 tests for thermal properties of insulation on five types of pipe insulation commonly used in active solar energy systems: elastomeric rubber, polyethylene (including a high temperature polyethylene), polyurethane, polyisocyanurate, and rigid fiberglass. After initial testing, one set of samples was set out on an exposure rack and retested after three months. Another set was heated to 100°C for one week, while a third was immersed in water for two weeks and then retested. We noted degradation of R-value in the samples after eleven months of exposure. Additional exposure will be necessary to provide significant results. High-temperature testing showed that polyethylene would melt above 100°C and elastomeric rubber would harden and lose some of its insulating

properties at the same temperatures. Even the polyethylene rated at 175°C shrunk severely when heated to 100°C. All samples except fiberglass showed no significant deterioration after saturation. 7 refs., 14 figs., 13 tabs.

47323 **(SV-UL-FUD-A—86-1) Lyckebo central solar heating plant. Final report.** Brunstroem, C. (Swedish State Power Board, Aelvkarleby). 25 Feb 1986. 20p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753115.

The main objective of the Lyckebo project is to develop and demonstrate a large scale solar district heating system with seasonal storage. Measured performance data from the first true year of operation is reported. An annual collector field heat production of 287 kWh per m/sb2/ at a global collector plane irradiation of 989 kWh per m/sb2/ was obtained, resulting in a collector field efficiency of 29 percent. The storage heat loss during the year amounted to 3.14 GWh, corresponding to 26 percent of the heat production. Only 65 percent of the storage capacity was exploited at the end of the injection period. This is explained by the low energy production due to an extremely low irradiation 1984, and the high heat losses. The relatively high storage losses are expected to decrease considerably during the following seasons when the rock surrounding the cavern have been heated. It is concluded that effective production and storage of solar energy is possible with highly efficient flat plate collectors connected to a rock cavern seasonal storage system. The relatively high investment needed for the system makes it at present not competitive with oil, heat pumps or electric heating. Further development is under way and significant system improvements and cost reductions have taken place during the past few years, increasing the cost effectiveness of this type of system.

1410 Solar Collectors And Concentrators

REFER ALSO TO CITATION(S) 47310

1420 Heat Storage

REFER ALSO TO CITATION(S) 47323

47324 **(SV-UL-FUD-B—86-15) Lyckebo project - Thermal Energy Storage in a Rock Cavern.** Brunstroem, C.; Larsson, M.; Pilebro, H. (Swedish State Power Board, Aelvkarleby). 17 Jun 1986. 12p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753118.

Technical details concerning design and operation of the Lyckebo rock cavern seasonal storage facility are presented. Thermal performance data from two years of operation are summarized and the economy of the system is discussed. During two years of operation 100 percent availability for energy distribution was obtained. The system heat loss was higher than expected. The difference was partly explained by heat losses from the transport tunnel and water leakage through cavern and shaft walls. The movable telescopic pipes work excellently ensuring a very good storage temperature stratification. The Lyckebo system shows that solar district heating with seasonal storage in a rock cavern is a technically realistic alternative in the Swedish energy system. Significant system improvements and cost reductions, which have taken place during the last years, have made this type of system close to economically competitive with other alternatives for district heating. (authors).

15 GEOTHERMAL ENERGY

1501 Resource Status And Assessment

47325 **(LA—10696-MS) San Ignacio (La Tembladera) geothermal site, Departamento de Francisco Morazan, Honduras, Central America: Geological field report.** Aldrich, M.J.; Eppler, D.; Heiken, G.; Flores, W.; Ramos, N.; Ritchie, A. (Los Alamos National Lab., NM (USA)). Jun 1987. Contract W-7405-ENG-36. 81p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87014714.

The San Ignacio (La Tembladera) geothermal site is located on the north side of the Siria Valley, Departamento de Francisco Morazan, near the village of Barrosa. Hot springs are located along a northwest-trending fault scarp at the edge of the valley and along north-trending faults that cross the scarp. The rocks in the area are primarily Paleozoic metamorphic rocks, overlain by patches of Tertiary Padre Miguel Group tuffs and alluvial deposits. Movement probably occurred along several faults during latest Tertiary and possibly early Quaternary times. Four spring areas were mapped. Area 1, the largest, is associated with a sinter mound and consists of 40 spring groups. About half of the springs, aligned along a north-south trend, are boiling. Area 2 is a small sinter mound with several seeps. Area 3 consists of a group of hot and boiling springs aligned along a north-trending fault. The springs rise through fractured schists and a thin cover of alluvium. Area 4 is located at the intersection of several faults and includes one of the largest boiling springs in the area.

1502 Geology And Hydrology Of Geothermal Systems

47326 **(AD-A—182345/9/XAB) Coso Monitoring Program. Summary report, October 1985-September 1986.** Edwards, E.M. (Naval Weapons Center, China Lake, CA (USA)). Feb 1987. 103p. (NWC-TP—6794). NTIS, PC A06/MF A01.

The Coso Monitoring Program is a continuing effort in support of the development of the Navy's Geothermal Resources within the Coso Known Geothermal Resource Area (KGRA). Data are presented on the monitoring of steam flow rates and temperatures, water levels in ponds and wells, water chemistry, temperature logs of shallow wells and rainfall in the Coso Hot Springs Resort Area. A weekly photographic essay of the mud pots and pools shows the variation of surface-water levels throughout the year.

47327 **(LA—10785-MS) Hydrogeochemical investigation of six geothermal sites in Honduras, Central America.** Goff, F.E.; Truesdell, A.H.; Grigsby, C.O.; Janik, C.J.; Shevenell, L.A.; Paredes, J.R.; Gutierrez, J.W.; Trujillo, Jr.; Counce, D.A. (Los Alamos National Lab., NM (USA)). Jun 1987. Contract W-7405-ENG-36. 183p. NTIS, PC A09/MF A01; 1; GPO Dep. File Number DE87014713.

We conducted detailed hydrogeochemical investigations at six geothermal sites in western Honduras: Azacualpa, El Olivar, Pavana, Platanares, Sambo Creek, and San Ignacio. None of the sites is associated with Quaternary silicic volcanism, although El Olivar lies adjacent to a small Quaternary basalt field and Pavana is part of a belt of hot spring activity parallel to and 35 km east of the Central American volcanic arc. None of the sites contains acid-sulfate waters indicative of vapor-dominated conditions. Thermal fluids are characterized by pH between 7 and 10, $Cl < 125$ mg/l, $HCO_3 > Cl$, $SO_4 \geq Cl$, $B \leq 17$ mg/l, $Li \leq 4$ mg/l, and $As \leq 1.25$ mg/l. Stable isotope analyses of the water show that recharge to the geothermal systems generally occurs from areas of higher elevation adjacent to the sites. Tritium contents of apparently undiluted thermal fluids range from 0 to 0.4 T.U., indicating residence times of fluids in the systems of more than 500 y. Various geochemical indicators show that mixing of hot and cold end-member fluids occurs in the system at Platanares and, to a lesser degree, in the systems at San Ignacio and Azacualpa. No mixing is apparent in the fluids discharging at Pavana, Sambo Creek, or El Olivar. Boiling is the dominant process responsible for subtle geochemical variations at Azacualpa and, possibly, San Ignacio. Our best estimates of subsurface reservoir temperatures are 225°C at Platanares, 190°C at San Ignacio, 185°C at Azacualpa, 155°C at Sambo Creek, 150°C at Pavana, and 120°C at El Olivar. The estimated power output of the three hottest sites is 45 thermal megawatts at Platanares, 14 thermal megawatts at San Ignacio, and 13 thermal megawatts at Azacualpa.

47328 **(LBL—23717) Heat and mass transfer in the Klamath Falls, Oregon, geothermal system.** Prucha, R.H. (Lawrence Berkeley Lab., CA (USA)). May 1987. Contract AC03-76SF00098. 177p. NTIS, PC A09/MF A01; 1; GPO Dep. File Number DE87014676.

Over the last 50 years significant amounts of data have been obtained from the Klamath Falls geothermal resource. To date, the complexity of the system has perplexed researchers, leading to the

development of only very generalized hydrogeologic and geothermal models of the area. Based on reevaluation of all available data, a detailed conceptual model for the Klamath Falls geothermal resource is proposed. A comprehensive 3-dimensional numerical model, based on the proposed conceptual model is also presented. This numerical model incorporates all of the main reservoir characteristics. Hot water recharge flows from depth, along a large normal fault, and flows into near surface permeable strata where it loses heat to surrounding beds and to mixing with cold regional groundwaters introduced from the north. By matching calculated and measured temperatures and pressures, hot and cold water recharge rates and the permeability distribution for the geothermal system are estimated. A semi-analytic solution and simple lumped parameter methods are also compared to the numerical analysis. Results suggest that the flow patterns within the geothermal system at Klamath Falls are complex and intimately associated with the permeability distribution and the pressures and temperatures at depth, within the faults.

1503 Geothermal Exploration And Exploration Technology

47329 **(LA—10619-HDR-Pt.1) Geological structures from televiewer logs of GT-2, Fenton Hill, New Mexico: Part 1, Feature extraction.** Burns, K.L. (Los Alamos National Lab., NM (USA)). Jul 1987. Contract W-7405-ENG-36. 43p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014710.

Patterns in reflected sonic intensity recognized during examination of televiewer logs of basement gneiss at the Hot Dry Rock Site, Fenton Hill, New Mexico, are due to geological fractures and foliations and to incipient breakouts. These features are obscured by artifacts caused by wellbore ellipticity, tool off-centering, and tool oscillations. An interactive method, developed for extraction of the structural features (fractures and foliations), uses human perception as a pattern detector and a chi-square test of harmonic form as a pattern discriminator. From imagery of GT-2, 733 structures were recovered. The acceptance rate of the discriminator was 54%. Despite these positive results, the general conclusion of this study is that intensity-mode imagery from Fenton Hill is not directly invertible for geological information because of the complexity of the televiewer imaging process. Developing a forward model of the intensity-imaging process, or converting to caliper-mode imagery, or doing both, will be necessary for high-fidelity feature extraction from televiewer data.

47330 **(LA—10619-HDR-Pt.2) Geological structures from televiewer logs of GT-2, Fenton Hill, New Mexico: Part 2, Rectification.** Burns, K.L. (Los Alamos National Lab., NM (USA)). Aug 1987. Contract W-7405-ENG-36. 43p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014711.

Televiewer logs from drill hole GT-2 at the Fenton Hill, New Mexico, Hot Dry Rock Site, have been rectified by conversion of structural traces on the scanner imagery to geographic location and orientation. The rectification method was direct inversion that consisted of mapping from the image to the wellbore, inverting the trace on the wellbore for principal points, and rotating from wellbore to geographic coordinates. From the test imagery of GT-2, 733 structures (fractures and foliations) were measured, compared with 42 structures from recovered core. The 733 new measurements listed in this report are a unique and unrepeatable collection of structural information from the Precambrian basement of northern New Mexico. This direct inversion method is accurate where the magnetic field vector is constant and the tool is centered and aligned in a circular wellbore. In other cases this method yields only approximate results.

47331 **(LA—11006-MS) Chemical analysis and sampling techniques for geothermal fluids and gases at the Fenton Hill Laboratory.** Trujillo, P.E.; Counce, D.; Grigsby, C.O.; Goff, F.; Shevenell, L. (Los Alamos National Lab., NM (USA)). Jun 1987. Contract W-7405-ENG-36. 87p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87014707.

A general description of methods, techniques, and apparatus used for the sampling, chemical anaiysis, and data reporting of geothermal gases and fluids is given. Step-by-step descriptions of the procedures are included in the appendixes.

47332 **(LA—11052-OBES) Downhole fluid sampling at the SSSDP [Salton Sea Scientific Drilling Project] California State 2-14 well, Salton Sea, California.** Goff, F.; Shevenell, L.; Grigsby, C.O.; Dennis, B. (eds.). (Los Alamos National Lab., NM (USA)). Jul 1987. Contract W-7405-ENG-36. 34p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014701.

In situ fluid sampling activities were conducted at the Salton Sea Scientific Drilling Project (SSSDP) well during late December 1985 and late March 1986 to obtain unflashed samples of Salton Sea brine. In late December, three sampling runs were made to depths of approximately 1800 m and temperatures of 300°C. In late March, 10 sampling runs were made to depths of approximately 3150 m and temperatures of 350°C. In brief, the Los Alamos tool obtained samples from four of eight runs; the Lawrence Berkeley tool obtained samples from one of one run; the Leutert Instruments, Inc., tool obtained samples from zero of three runs; and the USGS quartz crystal experiment was lost in the well. The most complete sample was obtained from run No. 11, using the Los Alamos sampler and Sandia battery pack/controller on a wireline. About 1635 ml of brine, two noble gas samples, and two bulk gas samples were collected from this run. Samples of brine and gas from productive runs have been distributed to about 15 researchers for various types of analyses. Chemical analyses by the Los Alamos and US Geological Survey analytical teams are presented in this report, although they are not corrected for flashing and precipitation.

47333 **(UCRL—97177) Development of fiber optics sensors for temperature measurement and chemical analysis in geothermal wells.** Angel, S.M. (Lawrence Livermore National Lab., CA (USA)). 10 Jul 1987. Contract W-7405-ENG-48. 4p. (CONF-871024—16). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014551.

From Annual meeting of Geothermal Resources Council; Sparks, NV, USA (12 Oct 1987).

In this paper the results of research on high temperature optical fiber sensors will be presented. We have shown that these sensors (optrodes) can be made to work in very high temperature water for long periods and that it is possible to measure pH using fluorescent inorganic ions doped into solid matrices. A high temperature pH optrode can be made using these techniques, however, more research is needed into the chemistry of the carrier matrices and fluorescent dopants.

1506 Environmental Aspects And Waste Disposal

47334 **(LBL—23721) An analysis of the hydrologic effects of proposed test drilling in the Winema National Forest near Crater Lake, Oregon.** Sammel, E.A.; Benson, S. (Lawrence Berkeley Lab., CA (USA)). Jul 1987. Contract AC03-76SF00098. 13p. (CONF-871024—17). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014114.

From Annual meeting of Geothermal Resources Council; Sparks, NV, USA (12 Oct 1987).

This paper describes the results of a preliminary study on the hydrologic regime underlying the Crater Lake Caldera, Oregon. The study was performed to provide a basis for evaluating the potential for polluting Crater Lake by drilling exploratory boreholes on the flanks of the mountain. A simple conceptual model of the hydrologic regime was developed by synthesizing the data from the region surrounding the Caldera. Based on the conceptual model, a series of numerical simulations aimed at establishing the basic groundwater flow patterns under and surrounding the lake were performed. In addition to the numerical simulations, we used simple volumetric techniques for estimating the distance that drilling mud would migrate away from the borehole if drilling proceeded without drilling fluid returns. Based on our calculations that show the regional flow of groundwater will oppose the flow of drilling mud toward the lake, and based on our volumetric estimate of drilling mud migration, our study concludes that drilling without returns will not pollute Crater Lake, nor will it affect the hydrologic regime in the immediate vicinity of the Crater Lake Caldera.

1509 Geothermal Engineering

47335 **(BNL—52054) Tapping the earth's geothermal resources: Hydrothermal today, magma tomorrow.** Kukacka, L.E. (Brookhaven National Lab., Upton, NY (USA)). 17 Dec 1986. Contract AC02-76CH00016. 18p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014718.

The paper discusses geothermal resources, what it is, where it is, and how to extract energy from it. The materials research activities at Brookhaven National Laboratory related to geothermal energy extraction are discussed. These include high-temperature, light-weight polymer cements, elastomers, biochemical waste processing techniques, and non-metallic heat exchanger tubing. The economics of geothermal energy is also discussed. (ACR)

17 WIND ENERGY

1701 Availability (climatology)

47336 **(STEV-VIND—87-12) Modification of wind speed and IBL-heights in a coastal region.** Bergstroem, H.; Johansson, P.E.; Smedman, A.S. (Statens Energiverk, Stockholm (Sweden)). 1986. 44p. NTIS (US Sales Only), PC A03. File Number DE87753105.

The internal boundary layer growth and the modification of the wind passing inland form the sea has been studied using a comprehensive amount of wind profile data. A simple wind is tested against the measurements and is found to give reasonably good results. It is shown, however, that the IBL-height may be determined from a wind model, or for wind profile data, alone. Instead an IBL height model of the type zsub(IBL) = a xsup(b) has been found to give satisfactory results. Here x is the distance from the coast, a and b are parameter which are functions of stability and surface roughness. A climatological estimate of the distribution of IBL-heights is given for the Naesudden WECS-site. The wind model has been used to estimate the reduction in wind speed in a coastal region for heights up to 100 m and to a distance of about 2.5 km from the coast. (authors).

47337 **(STEV-VIND—87-13) Statistical analysis of gust characteristics.** Bergstroem, H. (Statens Energiverk, Stockholm (Sweden)). 1987. 45p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753106.

Measurements of the turbulent atmospheric wind field have been analysed using different types of gust model concepts. The data represent a large variety of surface roughnesses and also a wide range of thermal stratifications. Measuring heights were between 7 m and 135 m. The resulting gust amplitudes and times have been analysed statistically. Suitable normalizations have made it possible to get generally valid probability distributions. (authors).

1706 Wind Energy Engineering

47338 **(SAND—87-7011) Pumped spoiling experimental program.** Sladky, J. Jr. (Kinetics Group, Inc., Mercer Island, WA (USA); Sandia National Labs., Albuquerque, NM (USA)). Aug 1987. Contract AC04-76DP00789. 129p. NTIS, PC A07/MF A01; 1; GPO Dep. File Number DE88000264.

This report documents a series of wind tunnel tests on a sample airfoil designed to evaluate and quantify the "pumped spoiling" concept. The test airfoil was a Sandia National Laboratories natural laminar flow section designated SAND-1850. All tests were operated at a Reynolds Number of 1.5 million with a model having a 1-ft chord and a 9-ft span. The spoiling perforations consisted of 1.6 mm diameter holes on 6.35 mm centers. The pressure in the internal plenum that supplied the spoiling air to the perforations was maintained at the tunnel dynamic head. Test results were consistent and repeatable. Up to an angle of attack of 6°, there was very little difference in the lift coefficient among the many test arrangements studied. Past 8°, however, the lift coefficient trends were very sensitive to the test configuration of the model. The report includes the test results for 32 combinations of the spoiling arrangements ranging from "clean" baseline airfoil to spoiling flow through all perforations. In addition to the section coefficients, the report presents model force data and section pressure profiles. 29 figs., 4 tabs.

47339 **(STEV-VIND—87-11) Estimation of lateral and vertical coherence for the Naesudden wind turbine.** Smedman, A.S. (Statens Energiverk, Stockholm (Sweden)). 1987. 32p. NTIS (US Sales Only), PC A03. File Number DE87753104.

Measurements of the lateral and vertical coherence of the three wind components have been carried out at the Naesudden WECS site. The separation distances are small (9 resp 12 m) compared to the measuring heights (65 resp 77 m). Data were sampled during all stability conditions. For the horizontal wind components the exponential model of the decrease of coherence can be used with the decay parameters suggested for the inertial subrange (D/Lsub(u) much smaller than 1). The coherence of the vertical component exhibits much more scatter than for stable conditions the decrease is no longer a monotonical function. Expressions for lateral and vertical coherence for the u- and v-components for the Naesudden site are given. These expressions are supposed to be used in practical applications such as fatigue and load calculations. (authors).

20 ELECTRIC POWER ENGINEERING

2001 Power Plants And Power Generation

REFER ALSO TO CITATION(S) 47101, 47421, 47700, 48130, 48165

47340 **(DOE/FE/60457—H2) Assessment of non-traditional uses of advanced coal utilization technologies in the industrial sector: Final report.** Simbeck, D.R.; Moll, A.J.; Dickenson, R.L. (SFA Pacific, Inc., Mountain View, CA (USA)). May 1987. Contract AC01-84FE60457. 62p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014298.

The use of coal in US industry has not reached the levels anticipated in many projections made since the "oil shock" period of the early 1970s. One reason for this is the lagging development of technologies to permit the use of coal in new applications. This report presents an analysis of three emerging non-traditional technologies and their potential applications. The technologies are: Atmospheric fluidized bed combustion for process heat, slagging combustors, and micronized coal. This work follows and builds on analyses completed in March 1985 (DOE/FE6045701) and May 1986 (DOE/FE60457-H1). These two earlier works analyzed the current and potential use of coal in the major energy intensive US industries of chemicals, oil refining, steel, pulp/paper, stone/clay/glass, and food. This report addresses the use of atmospheric fluidized bed combustion for process heat, slagging combustors, and micronized coal from the viewpoint of the following issues: General concept, status of technology, characteristics, applications, limitations, research and development needs, and outlook for use. 34 refs., 9 figs., 3 tabs.

47341 **(EPRI-AP—5425) Reliability analysis of a fault-tolerant gas turbine control system: Final report.** Young, R. (Arinc Research Corp., Annapolis, MD (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 76p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920586.

This report documents the reliability analysis of the General Electric MKIV Speedtronic control system performed by ARINC Research Corporation under EPRI Research Project 2101-7. The MKIV control is a fault-tolerant microprocessor-based system employing triply redundant control processors and critical instrumentation. The analysis consisted of review of actual operating history of the MKIV controls at three operating facilities and tracks each system's reliability growth from initial startup through several years of system operation. An independent reliability assessment of the MKIV system was performed by obtaining event, failure, and outage data from three different utility installations, representing 11 unit years and 69,852 fired hours of operation. Reliability growth analyses were performed using Duane and AMSAA models to estimate MTBF expected for a mature system considering both failures and forced outages. The analyses concluded that the system will

exceed the design reliability goal of one forced outage off line per unit per year.

47342 **(EPRI-CS—5415) Erosion resistant coatings for steam turbines: Final report.** Wlodek, S.T. (General Electric Co., Schenectady, NY (USA). Turbine Technology Lab.; Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 103p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920018.

A family of Cr_3C_2-based plasma sprayed coatings with a Fe-Cr-Al-Y or Co-Cr-Ni-W matrix were developed with up to a ten-fold improvement in solid particle erosion resistance over the type 422 stainless base at 1000°F, and erodent velocities up to 1040 ft./sec. This high level of erosion resistance was achieved by defining a method of precipitation strengthening the Cr_3C_2 with Cr_7C_3. During conventional, high-energy plasma spraying, the Cr_3C_2 loses 20% of its carbon by oxidation and deposits as a ultrafine-grained (200 A to 5 micron), metastable phase that, under proper conditions, will decompose to $Cr_3C_2 + Cr_7C_3$. The reaction can be promoted by use of the Fe-Cr-Al-Y or Co-Cr-Ni-W chemistries, spraying in air rather than in inert environments, use of -325 Cr_3C_2, and aging (1000 to 1200°F). Attempts to develop coatings based on Cr-B were unsuccessful. 21 refs., 36 figs., 12 tabs.

47343 **(EPRI-EL—5215) Extending applications of the transient energy function method: Final report.** Fouad, A.A.; Vittal, V.; Ni, Y.X.; Pota, H.R.; Nodehi, K.; Oh, T.K. (Iowa State Univ. of Science and Technology, Ames (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 129p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920011.

Direct transient stability analysis using the Transient Energy Function (TEF) method has made significant strides in the last few years. Reliable and accurate transient stability assessment for large power networks is now possible, at a steadily improved speed. In spite of the substantial progress achieved in Direct Transient Stability Analysis, the technique is still limited to a simple power system model, i.e., the so-called classical model (constant generator voltage, constant impedance loads, etc.). This model, while adequate for first swing transient analysis in many situations, is inadequate in other important ones. Furthermore, some important power system components are not included in the power system model currently used in direct transient stability analysis. Using the equations developed in this study, utility engineers can model generator excitation and high-voltage direct-current systems in direct stability calculations. This capability will broaden and quicken the application of a new, powerful analytic tool for power system planning and operations. 32 refs., 28 figs., 31 tabs.

47344 (EPRI-NP—4902-SR, pp 48.1-48.18) **NDE of fossil plant steam piping.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

In June 1985, the rupture of a 32-inch-diameter, seam-welded steam line at Southern California Edison's Mohave Electric Generating Station resulted in the loss of seven lives and prompted an industry-wide inspection program. This concern was further heightened after a similar rupture occurred, in January 1986, at Detroit Edison's Monroe Station. No loss of life was experienced as a result of the Monroe incident. A rupture of a similar nature had occurred previously, in 1979; however, the generic implications of the failure were not apparent at that time. Steam lines from these plants were examined and, based on the limited details of these failures, initial criteria for potential candidate steam pipe systems were characterized. In this paper, the authors have attempted to review the current status of the seam-welded steam piping problem, applicable NDE approaches, and the EPRI Guideline for the Evaluation of Seam-Welded Steam Piping. Much has been learned during the past year regarding this problem; however, many areas remain that are not fully understood.

47345 **(INIS-mf—10706) Special conference on thermal energy 'Yugoslavia 1986'. Proceedings.** (VGB Technische Vereinigung der Grosskraftwerksbetreiber e.V., Essen (Germany, F.R.)). 1986. 368p. (In German). (CONF-8605275—). NTIS (US Sales Only), PC A16/MF A01. File Number DE87752788.

From VGB special meeting on Yugoslavia; Bled, Yugoslavia (14 May 1986).

This volume contains various papers held at the conference 'Thermoenergetica 1986'. The papers cover subjects ranging from the development of thermal energy in Yugoslavia via fluidized-bed combustion and experience gained with the construction and operation of coal-fuelled plants to the grinding and combustion of coals rich in inerts, pollution problems, fouling and slag formation, service life, stress-induced crack corrosions, and to the planning, construction and operation of nuclear power plants. (HAG).

47346 **(KTM/E-D—125) Use of standby generators for cutting the peak loads of electricity. Preliminary study.** Tuomela, J.; Untinen, S. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 163p. (In Finnish). NTIS (US Sales Only), PC A08/MF A01. File Number DE87753062.

The existing standby generators, their technical, legislative and economic applications to the cutting of peak loads are researched in this preliminary study. The study applies only to those standby aggregates which are driven by diesel engine and whose total output is 50-3500 kW. The greatest unit output of the diesel engine is usually about 500 kW. The peak load cutting investment of a 150 MW aggregate group is 226 million FIM smaller than that of a peak-load gas turbine power plant with the same output. The energy price of electricity generated with standby aggregates is 23-34 p/kWh depending on the specific fuel consumption, application of electricity and purchase tax liability of the consumer. According to the research the most critical factors when changing a standby generator to peak load cutting are the amount and temperature of motor oil, endurance of reduction gear and the size of fuel storage tank. In order not to risk the standby operation due to wearing of diesel engine, the annual running time of the machinery shall be restricted to 800-1200 h/a. The costs of the changes and extensions in the existing apparatus as well as the prime costs of proper peak load cutting control equipment were surveyed in the study. The former vary from case to case, whereas the latter are affected by the peak load cutting method, i.e. whether operated independently of the public electricity supply system or parallel with it.

47347 **(NEI-FI—5) Properties of gasturbines available in the market in combined production of electricity and heat.** Kaarlonen, K. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 26 Nov 1986. 70p. (In Finnish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753335.

Gas turbines differ for example from steam boilers and turbines in that they are only manufactured in certain standard designs, among which the best gas turbine must be selected for each application. In combined cycle power plants, the characteristics of the gas turbine are vital for the efficienty of the entire plant. The study reviews gas turbines available in the market and calculated total power plant outputs and efficiencies for combined cycle and waste heat boiler plants without supplementary firing and with restricted supplementary firing. Without supplementary firing, the power-to-heat ratios in waste heat boiler plants were found to vary in the range 0.23-0.78, with an average of 0.53. In combined cycle plants the power-to-heat ratio was found to vary in the range 0.48-1.08, the average being 0.82. The average total efficiency without supplementary firing was about 85% in both plants, varying in the range 80-91%. When examining the influence of the gas turbine's efficiency and specific output on the power-to-heat ratio and total efficiency of the complete plant, the gas turbine's efficiency and specific output were found to correlate clearly with the power-to-heat ratio of the complete plant. Neither factor appeared to have any significant influence on the total efficiency of the plant.

47348 **(NEI-FI—17) Combined power plant using natural gas.** Kaikkonen, P. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1986. 57p. (In Finnish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753064.

A combined power plant with rated power of under 500 kW and its suitability and profitability in Finland has been studied. 30-35% of the energy content of the fuel, in this case natural gas, can be transferred to electric power and 45-55% to heat. So the total

efficiency can be up to 90%. Three cases have been choosen into the study. In the first case there was a 210/300 kW/sub e//kW/sub 1/ combined power plant in a hospital. Although the main part at the produced electric power is sold to the local electric power plant, the profitability was low. As the second case there was a power plant which got a 400/560 kWe/kW, combined power plant. The produce electric power replaces the normally paid electric power and the heat can be used in heating of the district heating water. In this case, too, the profitability was low. In the third case the combined power plant was used by a small or medium sized industrial plant. The plant itself produces all the needed heat and buys the electric power from the local electric power plant. This sort of investment seemed to be quite profitable. According to the study the amount of the investment and the price of electricity are the main factors affecting to the profitability.

47349 **(NP—7770318) Experimental determination of the vibration-exciting forces in two turbine blade profiles.** Hubensteiner, M. (Technische Univ. Muenchen (Germany, F.R.). Fakultaet fuer Maschinenwesen). 30 Apr 1986. 159p. (In German). NTIS (US Sales Only), PC A08. File Number DE87770318.

Many outages of industrial steam turbines are the result of damage on the blades, caused by grid vibrations in case of transient flow. The author presents steady-state and transient-state investigations of the grid interference characteristics of two turbine black profiles. Pressure distributions along the blade profile circumference were measured in a wind tunnel in a double-grid set-up as a function of the relative position. The frictional wake of the two profiles was determined experimentally for different grid spacing, and an empirical approximation was derived describing the instability shape as a function of distance and of various grid parameters. The transient pressure distribution at the blade profiles was measured in the experimental air turbine in order to determine the excitation forces. There is a special chapter on data acquisition and data processing. (HAG).

47350 **(ORNL/TM—10429) Expert systems and microwave communication systems alarms processing: A feasibility study.** Tonn, B.; Goeltz, R.; Purucker, S. (Oak Ridge National Lab., TN (USA)). Jul 1987. Contract AC05-84OR21400. 71p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000026.

This report presents the results of a feasibility study conducted by Oak Ridge National Laboratory (ORNL) for the Bonneville Power Administration concerning the applicability of Artificial Intelligence (AI) technology to process alarms associated with Bonneville's Microwave Communication System (MCS). Specifically, the discussion focuses on the characteristics of a prototype expert system/database management system (DBMS) configuration capable of intelligently processing alarms, efficiently storing alarm-based historical data, and providing analysis and reporting tools. Such a system has the potential to improve response to critical alarms, increase the information content of a large volume of complicated data, free operators from performing routine analysis, and provide alarm information to operators, field personnel, and management through queries and automatically produced reports.

47351 **(PB—87-203196/XAB) Evaluation test on a landfill gas-fired turbine at the Los Angeles County Sanitation District's Puente Hill Landfill Electric Generation Station. Air pollution test report.** (California State Air Resources Board, Sacramento (USA). Stationary Source Div.). Jul 1986. 177p. (ARB/SS—87-07). NTIS, PC A09/MF A01.

A cooperative test program was conducted from February 25 through February 27, 1986 by Air Resources Board (ARB) and South Coast Air Quality Management District (SCAQMD) staff to evaluate the gaseous constituents from untreated landfill gas used to fuel a turbine and the emissions from that turbine located at the Los Angeles County Sanitation District's Puente Hills Electric Generating Station. The turbine was fueled with gases generated by the anaerobic decomposition of buried refuse at the Los Angeles County Sanitation District's Puente Hills Landfill. Emissions of criteria pollutant as determined from ARB test data are reported. Mass flow rates and destruction and removal efficiencies (DRE) of non-criteria pollutant compounds determined at the stack from SCQAMD bag-sample test data and mass-flow rates and DRE's for chlorinated and aromatic compounds determined from data from ARB resin samples are presented. Destruction and removal efficiencies based on mass-flow rates for chlorinated compounds ranged from 17 to 99+ percent and for aromatic compounds ranged from negative to 99+ percent. The possible formation of the compounds - chlorinated dioxins, furans, and polychlorinated biphenyls - was considered and samples were taken for analyses for these compounds. Dioxins, furans, and polychlorinated biphenyls were not detected in the inlet nor the outlet gas stream samples.

47352 **(PB—87-213112/XAB) Evaluation of utility-boiler radiant furnace residence time/temperature characteristics: field tests and heat-transfer modeling. Final report, October 1982-September 1985.** Cetegen, B.M.; Richter, W.; Reese, J.L.; LaFond, J.; Folsom, B.A. (Energy and Environmental Research Corp., Irvine, CA (USA)). Jun 1987. 484p. NTIS, PC A21/MF A01.

This report describes an investigation of the adequacy of a modeling approach in predicting the thermal environment and flow field of pulverized-coal-fired utility boilers. Two 420-MWe coal-fired boilers were evaluated: a single-wall-fired unit and a tangentially fired unit, representing the two commonest boilers in the U.S. Extensive field measurements were conducted on each unit to determine detailed temperature, heat-flux gas-species composition, and flow field data for a range of operating conditions. Separate modeling approaches were used to predict boiler thermal performance and flow characteristics. A three-dimensional zone method of analysis was used to predict local and overall heat transfer, temperature profiles, and fuel burnout. Such predictive tools provide a sophisticated treatment of radiative heat transfer, but are decoupled from the furnace flow field. This input to the heat-transfer code was obtained from detailed measurements in reduced-scale isothermal physical flow models of the two boilers. Comparisons between model predictions and the detailed field measurement data demonstrated the viability of this approach in predicting furnace performance, and in extrapolating limited available data to alternate operating conditions. Overall thermal performance can, in general, be predicted accurately.

47353 **(PB—87-222717/XAB) Natural gas/pulverized-coal cofiring performance testing at an electric-utility boiler. Topical report, June-October 1986.** Booth, R.C.; Breen, B.P.; Gallaer, C.A.; Glickert, R.W. (Energy Systems Associates, Tustin, CA (USA)). Jul 1987. 199p. NTIS, PC A09/MF A01.

A field testing program was conducted at a 570-MW pulverized-coal electric-utility boiler to document the potential of cofiring natural gas with coal. The capacity of the gas equipment is 20% of the boiler rating. The report discusses the use of natural gas for sulfur control, smokeless start-ups, combustion improvement, control of furnace slag, carrying load during coal upsets and improving operation while firing potentially troublesome coals. Gas used for start-up and low load flame stabilization maintained precipitator cleanliness as confirmed by internal inspections. Testing documented the predicted change in flue-gas moisture concentration during cofiring. Also, the flue-gas acid dew point temperature was actually lowered by one to three degrees during cofiring. The optimization test program confirmed that gas use is a convenient and reliable method for maintaining production during coal upsets. The 120-MW design capacity of the gas system was achieved. Gas cofiring can be implemented to achieve an immediate reduction in SO_2 emissions. This gives greater coal-blending flexibility, while insuring that no SO_2 violations need occur. Utilizing the warm-up guns resulted in a 15% reduction in nitric oxide emissions.

47354 **(TVA/OP/EDT—87/14) Homeostatic utility controls applied to TVA: Final project report.** Puettgen, H.B.; Ghoudjebaklou, H. (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology; Georgia Inst. of Tech., Atlanta (USA). School of Electrical Engineering). Mar 1986. 128p. NTIS, PC A07/MF A01. File Number DE88900011.

This project concerns a way for a utility to interact with its customers to achieve a better load profile. The customers are those

who have some degrees of freedom as far as their load schedules are concerned. Such a customer, a Small Power Producing Facility (SPPF), may shift its demand during the day or may be selling energy back to the utility during parts of the day. The utility must provide incentives for the customer that "help" the utility load curve; these incentives are the energy rates. The fundamental question is how a particular SPPF will react to a set of selling and buying prices when it carries out an optimization of its own operation. Another problem is that of sizing, during the plant design stages, of some of the on-site SPPF facilities, such as the on-site energy storage capacity. This can be done once the energy selling and buying rates are set. These design oriented problems are of importance when a utility advises its customers as to what type and size of on-site installations are financially feasible. However, the only true "control" that the utility has over the SPPF is through the selling and buying of energy rates. It is of key importance to be able to determine a set of selling and buying energy rates which, while still within reasonable limits, "induce" the proper behavior by the SPPF to satisfy the utility desired constraints. The global impact of all SPPF's on the utility system has also been evaluated in this project. 46 refs., 19 figs., 48 tabs.

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REFER ALSO TO CITATION(S) 47025, 47054, 47055, 47062, 47063, 47278, 47279, 47280, 47281, 47282, 47283, 47284, 47285, 47286, 47287, 47288, 47289, 47290, 47291, 47292, 47293, 47294, 47352, 48359

47355 (DOE/PC/70771—T7) Kinetics of nitrogen and sulfur reactions in combustion systems: Quarterly technical progress report No. 9. (Energy and Environmental Research Corp., Irvine, CA (USA)). [1987]. Contract AC22-84PC70771. 40p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014472.

The main thrust of the work was the continuation of the modeling studies of NO destruction by soot particulates. The computation took into account the decrease of soot concentration via oxidation. Since the mechanism of soot oxidation is governed mainly by the reaction between OH radicals and soot particulates, we have incorporated a limited set of detailed kinetics for the downflow coal flame. The kinetics included one hundred and nineteen reactions with twenty-seven species. The details of the modeling and the results are described. EER currently has four models of the SO_2-CaO high-temperature reaction: (1) the grain model of Silcox et al. (1985); (2) a pore model similar to that of Bhatia and Perlmutter (1980, 1981); (3) the distributed pore model of Newton and Pershing (1987); and (4) a distributed pore model similar to that of Christman and Edgar (1983). Recent work has focused on the latter two models, which are similar in many respects. They both consider a distribution of pore sizes obtained from porosimetry measurements, internal pore diffusion, filling of the pore structure with product ($CaSO_4$) as the reaction occurs, external diffusion to the particle surface, and sintering of the pore structure. The primary difference is that the model of Christman and Edgar (1983) considers the pores to be interconnected, while the model of Newton and Pershing (1987) assumes non-connected pores. Both models yield the same predictions of sorbent utilization when a mono-sized pore is considered (using the same physical constants). Pore mouth closure is predicted to control the extent of the SO_2-CaO reaction. When a distribution of pores is considered, the interconnected model yields higher predictions than the non-interconnected model.

47356 (DOE/PC/91024—T3) Characterization and fundamental studies on CuO sorbent materials to determine attrition mechanisms on substrate gamma alumina: Technical progress report number 2 for the period December 23, 1986 to March 23, 1987. Mote, J.D.; Eucker, P.; Guo, Yanfeng. (Denver Univ., CO (USA). Dept. of Engineering). 1987. Contract AC22-86PC91024. 24p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013554.

During this period uncoated and coated alumina particles were examined by optical microscopy, using both reflected and transmitted light, and naturally fractured surfaces of specimens removed from the as received materials were examined in the scanning electron microscopy. X-ray powder diffraction patterns were obtained for each of the materials to confirm the predominant phase(s) present. Mechanical testing included microhardness determinations and impact experiments. Samples from each of the material categories were screened to determine the gross distribution of particles below the nominal 1/16 in. diameter sphere.

47357 (EPRI-AP—5347) NO/sub x/ reduction for small gas turbine power plants: Final report. Smith, K.O. (Solar Turbines, Inc., San Diego, CA (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 89p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920012.

Through the lean premixed combustion of natural gas, gas turbines can achieve ultralow NO/sub x/ emissions - below 10 ppM at 15% oxygen (O_2) - under typical operating conditions. This work represents the first step in developing an advanced gas turbine combustion system that can yield ultralow NO/sub x/ levels without the need for costly strategies.

47358 (EPRI-CS—5371) Laboratory protocol to demonstrate equivalency for plant wastewater cotreatment: Final report. Hicks, R.E.; Shukla, H.; Goldstein, D.J.; Hicks, M. (Water General Corp., Lexington, MA (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Aug 1987. 89p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920556.

The feasibility of utilizing power plant ash ponds as a treatment system for waterside chemical metals cleaning wastes was examined. A summary of pertinent literature in the field and the present status of ash pond treatment technology was presented. A proposed laboratory protocol for demonstrating the equivalency of dedicated and ash basin treatments for chemical metal cleaning wastes was also assessed. Three wastes were treated by mixing with ash pond water and ash samples obtained from utilities. The protocol was successful in demonstrating the potential of ash basin treatment and in defining the steps required to achieve equivalency. In particular, the simple laboratory test of strong alkali addition provided reliable information on the degree of treatment that could be obtained on contacting with ash and pond waters. The removal of metals bound in soluble complexes was promoted by dilution and oxidation to dissociate the complexes, or by adsorption of the complexes onto ash. Two acid wastes (hydroxyacetic/formic acid and hydrochloric acid) were successfully treated by the combined effect of ash and pond waters. Attempts to precipitate copper in a Vertan waste failed.

47359 (EPRI-CS—5408-CCM) Retrofit FGD [Flue Gas Desulfurization] cost estimating guidelines: Computer user's manual. Keeth, R.J.; Shattuck, D.M.; Ireland, P.A.; Sebesta, J.J. (Stearns Catalytic Corp., Denver, CO (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 151p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920006.

This program enables the utility engineer to determine site-specific retrofit costs for six Flue Gas Desulfurization (FGD) processes: Conventional Wet Limestone, Limestone with Forced Oxidation, Lime Double Alkali, Lime Spray Drying, Wellman-Lord, and CT-121. The calculation methodology is based on EPRI Report CS-3696, "Retrofit FGD Cost Estimating Guidelines" published in October 1984, which applies a series of factors to the cost of a new FGD system. The factors correct for site-specific conditions, such as process variables, location, and retrofit difficulty. The following calculations are performed in the program: Total Retrofit Capital Requirement; First-Year Operating and Maintenance (O & M) cost; and Total Levelized Cost. The program uses the Detailed Retrofit Cost Estimate as described in EPRI-CS-3696 with one major exception. The program is equipped to handle up to 5 units of different size, with different fuel characteristics, retrofit difficulty, process variables, etc. Common shared equipment, such as reagent preparation and waste disposal, can also be included.

47360 **(PB—87-210399/XAB) Chemical, aerosol, and optical measurements in the plumes of three midwestern coal-fired power plants.** Richards, L.W.; Anderson, J.A.; Blumenthal, D.L.; McDonald, J.A.; Macias, E.S. (Sonoma Technology, Inc., Santa Rosa, CA (USA)). 1985. 22p. NTIS, PC A02/MF A01.

Pub. in Atmospheric Enviroment, Vol. 19, No. 10, 1685-1704(1985).

Airborne measurements were made in and near the plumes of the followiing midwestern coal-fired power plants in 1981: Kincaid in central Illinois in February, LaCygne near Kansas City in March, and Labadie near St. Louis in August and September. One objective of these measurements was to obtain data (reported elsewhere) to be used for the evaluation of plume visibility models. The results of the chemical and aerosol measurements are reported here.

47361 **(STEV-FBT—87-18) Influence of ammonia and hydrogen peroxide addition on NOsub(x) emissions in the flue gas channel of a 16 MW coal fired fluidised bed combustor.** Cooper, D.A. (Statens Energiverk, Stockholm (Sweden)). Apr 1987. 28p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753362.

Preliminary tests aimed at reducing NOsub(x) emissions in the flue gas channel of a 16 MW Atmospheric Fluidised Bed Combustor have been undertaken using the injection of NHsub/3//Hsub/2/Osub/2/ mixtures. A Further investigation of the potential of this technique was carried out with a chemical kinetic model involving homogeneous gas phase reactions. The modelled optimal conditions indicated that for NHsub/3//NO equal to 1.5, Hsub/2/Osub/2//NO equal to 0.7, a flue gas temperature of 690-710 degrees C and with the combustor being fired at an air factor of 1.2-1.3, ca. 70 percent NOsub(x) reduction can be achieved without high levels of residual NHsub/3/.

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47362 **(CONF-871083—1-Summ.) Comparison of costs and benefits for dc and ac transmission.** Long, W.F.; Stovall, J.P. (Wisconsin Univ., Madison (USA). Dept. of Electrical and Computer Engineering; Oak Ridge National Lab., TN (USA)). Apr 1987. Contract AC05-84OR21400. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87008774.

From C.I.G.R.E. AC/DC transmission interactions and comparison symposium; Boston, MA, USA (28 Oct 1987).

This paper summarizes the results of a study conducted by the US Department of Energy, Office of Energy Storage and Distribution, to determine generic cost differences between dc and ac systems, and to identify situations where dc is clearly advantageous for long distance and bulk power transport. Data are presented which can aid in determining dc converter station costs as a function of megawatt rating, dc voltage, and ac voltage. Transmission system cost data are also presented. 9 refs., 5 figs., 2 tabs.

47363 **(CONF-8710138—1) 12-phase as a transmission alternative.** Wilson, D.D.; Stewart, J.R.; Gnadt, P. (Power Technologies, Inc., Schenectady, NY (USA); Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 7p. NTIS, PC A02. File Number DE87013682.

From Joint IEEE/CSEE conference on high voltage transmission systems in China; Beijing, China (17 Oct 1987).

Modern bulk power systems require that several thousand megawatts be transmitted on single rights-of-way. The historic approach to accomplishing this level of synchronous transfer has been extra-high-voltage AC, i.e., voltages greater than 230 kV and less than 1000 kV. While extra-high-voltage 3-phase AC has proven to be both efficient and operationally successful, a new AC alternative, high phase order, offers advantages in many applications. The concept of high phase order transmission is not new, having been the subject of a patent in 1966. It has been shown that the most efficient method of electric power transmission in air dielectric at low frequencies (e.g., 50 to 60 Hz) is high phase order. Serious analysis of the technical and economic characteristics of high phase order were initiated in the 1970s and testing on experimental lines began in 1979. This extensive work has shown advantages of high phase order in ground level electric fields, audible noise, radio noise and physical size of structures. These advantages translate into greater efficiency of rights-of-way. Of particular importance is, that for equivalent electrical line loadings, the voltage of the high phase order line is significantly lower than for the 3-phase alternatives. This can be of primary importance in nations that do not have the manufacturing and test facilities to design, build and repair the components and equipment necessary for, for example, 800 kV. This paper reviews these facts. 5 refs., 6 figs., 4 tabs.

47364 **(EPRI-EL—5302) Finite element simulation and automated defect detection for thyristors: Final report.** McCleer, P.J. (Michigan Univ., Ann Arbor (USA). Dept. of Electrical Engineering and Computer Science; Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 65p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920010.

This research project seeks (1) to develop a working finite element simulation tool which can be used in the design of high power thyristor devices, and (2) to determine if small, near surface defects in large area power devices can be found and eliminated. All physical mechanisms needed to accurately model two dimensional high power thyristor structures, including heat flow, are included in the finite element simulation package. The completed program package is capable of simulating both static and dynamic thyristor operation, including device circuit interaction. The extremely large surface areas of power devices greatly enhance their susceptibility to defect induced failures resulting in product line yield limitations and subsequent forced cost recovery (i.e., higher prices). The defect detection/elimination task of this project addresses the defect-yield problem of large area power devices, not from an improved or more stringent material or fabrication process approach, but rather from a fix-it after it's broken approach. We have studied the potential of searching with IR sensors the surface area of freshly fabricated large area power devices, under constant controlled non-destructive current excitation, for areas of localized excessive heating. Such areas would indicate localized defects. We have also studied the potential of effectively removing these defect areas by use of destructive/isolating laser beam bombardment. 12 refs., 37 figs., 2 tabs.

47365 **(EPRI-EL—5375) Review of load tests on deep foundations subjected to repeated loading: Final report.** Turner, J.P.; Kulhawy, F.H.; Charlie, W.A. (Cornell Univ., Ithaca, NY (USA). Geotechnial Engineering Group; Electric Power Research Inst., Palo Alto, CA (USA)). Aug 1987. 546p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920014.

This study summarizes the results of 82 case histories reporting the results of field and laboratory repeated load tests on deep foundations, which are typical of those used to support electrical transmission line structures. Three types of deep foundations are considered, including soil anchors, driven piles, and drilled shafts. Also, three categories of repeated loading are considered, including axial repeated loading, lateral repeated loading, and combined axial and lateral loading in which one or both components of load are applied repeatedly. Each load test summary includes the available soil property information, foundation characteristics, loading information, and test results. The results of each group of repeated load tests for each type of deep foundation are discussed and summarized, with particular emphasis on the effects of repeated loading on foundation capacity and displacements. This study presents a documented data base and an overview for assessing the current state of knowledge in the design and analysis of foundations supporting transmission line structures, which are subjected to complex modes of repeated loading. 106 refs., 12 figs., 9 tabs.

47366 **(EPRI-EL—5387) Characterization of failed solid-dielectric cables: Phase 2, Final report.** Stember, L.H.; Derringer, G.C.; Epstein, M.M.; Gaines, G.B.; Hassell, J.A.; Hattery, G.R.; Thomas, R.E. (Battelle Columbus Labs., OH (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 172p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920001.

Eight field-aged cross-linked polyethylene (XLPE)-insulated 15 kV cables, consisting of two groups of four cables differing in

age and wall thickness, were excavated and provided for testing by the utilities participating in this study. Each group covered a range of operating electrical stress. Degradation in these cables was determined by measurements of ac breakdown strength. Insulation specimens removed from the cables were studied in the laboratory to characterize the presence or absence of antioxidants, peroxide decomposition products, other volatiles as could be identified, and morphological features. Most of the field-aged cables contained high levels of volatiles that has coalesced in some cases to produce a halo in freshly exposed cross sections. The volatile contents of the insulations and their ac breakdown strengths were found to be inversely correlated by a power-law relationship. Significantly, ac breakdown strength for insulations containing halos were found to correlate inversely with operating electrical stress; no correlation was found for the cables not containing halos or for the complete population of eight cables. The combined influence of age and thinner insulation wall appeared to lead to lower breakdown strength, although the effect was small as compared to that of residual volatile content. 12 refs., 1 fig., 2 tabs.

47367 **(EPRI-EL—5431-Vol.2) Optical power line voltage and current measurement systems: Volume 2, Assessment of future optical measurements of voltage and current in electric power systems: Final report.** Hillhouse, D.L. (National Bureau of Standards, Washington, DC (USA). Center for Electronics and Electrical Engineering; Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 71p. NTIS, PC A04/MF A01 - Research Reports Center, Box 50490, Palo Alto, CA 94303; 1; GPO Dep. File Number DE88000062.

This report summarizes the results of an investigation into the technical and economic reasons for improving power system voltage and current measurements, with special emphasis on the prospects for utilizing optical technology. The investigation assesses information from interviews with representatives of utilities and manufacturing companies, along with other information from published sources. According to interviewees, the shortcomings of the established technology and the claimed advantages of the new one do not warrant an immediate switchover to new technology. However, there was also a consensus among those interviewed that a long-term trend toward the optical measurement systems has begun and that optical measurement technology will ultimately be used in the power grid. Measurement system needs were: lower cost alternatives; greater dynamic range for current transformers; the demand for more accurate metering; fiber optic data transmission which is broadband, very fast, and free from electrical interference, properties which are required by computer-controlled systems, computer control which requires more real time data. The report concludes with a recommendation for a carefully structured and coordinated program of research and development. 43 refs., 3 figs., 3 tabs.

47368 **(ORNL/Sub—85-27461/1) The effects of corona on current surges induced on conducting lines by EMP [electromagnetic pulse]: A comparison of experiment data with results of analytic corona models.** Blanchard, J.P.; Tesche, F.M.; McConnell, B.W. (LuTech, Inc., Lafayette, CA (USA); Oak Ridge National Lab., TN (USA)). Sep 1987. Contract AC05-84OR21400. 125p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE87014970.

An experiment to determine the interaction of an intense electromagnetic pulse (EMP), such as that produced by a nuclear detonation above the earth's atmosphere, was performed in March, 1986 at Kirtland Air Force Base near Albuquerque, New Mexico. The results of that experiment have been published without analysis. Following an introduction of the corona phenomenon, the reason for interest in it, and a review of the experiment, this paper discusses five different analytic corona models that may model corona formation on a conducting line subjected to EMP. The results predicted by these models are compared with measured data acquired during the experiment to determine the strengths and weaknesses of each model. 25 refs., 71 figs.

21 NUCLEAR POWER PLANTS

REFER ALSO TO CITATION(S) 47464

2101 Power Reactors, Non-breeding, Light-water Moderated, Boiling Water Cooled

REFER ALSO TO CITATION(S) 47344, 47412, 47450, 47466, 47470, 47484, 47485, 47486, 47487, 47488, 47491, 47492, 47493, 47495, 47497, 47498, 47508, 47509, 47511, 47513, 47516, 47518, 47523, 47524, 47525, 47526, 47527, 47528, 47529, 47531, 47532, 47537, 47539, 47541, 47549, 47551

47369 **(EIR—613) Activity buildup in the recirculation system of boiling water reactors.** Grauer, R. (Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland)). May 1987. 126p. (In German). NTIS (US Sales Only), PC A07/MF A01. File Number DE87702885.

The deposition of activated corrosion products in the recirculation system of boiling water reactors produces increased radiation levels which lead to a corresponding increase in personnel irradiation dose rates during shut down and maintenance. The major part of this dose rate is due to Co-60. Based on a comprehensive literature study concerning this theme, the author has attempted to identify the individual stages of the activity build up and to classify their importance. The following areas are discussed in detail: - the origins of the corrosion products and of Co-59 in the reactor feedwater; - the consolidation of the cobalt in the fuel element crud deposits (activation); - the release and transport of the Co-60; - the build up of Co-60 in the corrosion products of the primary circuit. Existing models for the build up of cirquit radioactivity are discussed and the operating experience from selected reactors are summarized. Finally the state of the art of knowledge concerning the individual stages in the development of the activation build up is depicted. This highlights the existing gaps and thus identifies areas for possible R+D activities. Corrosion chemistry aspects of the cobald build up in the primary cirquit have already been studied on a broad basis and are continuing to be researched in a number of centers. The crystal chemistry of austenitic steel corrosion products poses a number of yet unanswered questions. There are major loopholes associated with an understanding of the activation processes of the cobalt deposited on the fuel elements and in the mass transfer of Co-60. For these processes, the most important influence stems from factors associated with colloid chemistry. In this respect there is ample room for new and original research contributions. It is recommended that sections 8 and 9 of this report should be read as an 'Executive Summary'.

47370 (EPRI-NP—4902-SR, pp 3.1-3.11) **Continuous high-temperature surveillance instrumentation for Dresden-2 hydrogen water chemistry program.** Fleming, M.F.; Mitchell, R.A.; Nelson, J.L. (Amdata, Inc., San Jose, CA). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The objective of this program (under EPRI Contract RP1930-11) is to install and operate a high-temperature surveillance instrumentation system capable of monitoring the length of cracks in boiling water reactor (BWR) piping during plant operation. The ability to measure crack growth in BWR power plant piping welds is important to rapidly identify the effectiveness of repairs (such as the Hydrogen Water Chemistry Program). The feasibility of a system capable of continuous ultrasonic instrumentation at 600°F (288°C) was successfully demonstrated at the Dresden-2 suction line known as N1B. This intergranular stress corrosion cracking (IGSCC) surveillance instrumentation is sound in principal, because it survived on N1B for a time period of more than nine months from April 1985 to January 1986 (the last time data were recorded). The redesigned low-profile transducer system used for this system operated successfully for the same nine-month time period. This low profile transducer fits in the two-inch space normally occupied by insulation. As a result of poor routing of the coaxial cables running from the low-profile transducer to the electrical feed-throughs between the drywell and containment, these cables melted. Other instrument cables nearby were not damaged.

47371 (EPRI-NP—4902-SR, pp 4.1-4.8) **Utility guide to advanced UT systems for PSI and ISI.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The number of automated UT inspection systems and techniques, currently in the marketplace or being developed, has grown in recent years to the point where a utility engineer reviewing this field is faced with a major task in trying to decide what inspection technique and system will meet his inspection requirements. Recognizing the utility engineer's problem, EPRI initiated this project to produce a utility engineer's guide to advanced, automated UT systems. Of principal concern are those that have been recently introduced, and designed for problem areas such as BWR piping. Older automated scanning systems, used primarily for pressure vessel inspection, are not being ignored, but are not covered here. Costs, benefits and inspection time are addressed for several systems in this report.

47372 (EPRI-NP—4902-SR, pp 6.1-6.5) **Application of medical UT technology to the utility industry.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Real-time ultrasonic imaging offers several unique advantages not available in other UT inspection systems. Because it duplicates man's normal visual experience, it is more easily interpreted and provides for a better interface between manual manipulation of the transducer and man's visual/brain interpretive senses. Additionally, because of the large number of images displayed (greater than the eye's fusion rate), there is the ability to incorporate unique noise suppression techniques as well as image superposition modes. An earlier completed objective of this project has been to perform a proof-of-principle demonstration of the integration of longitudinal and shear wave data to create an L/S wave superposed image. This technique offers a unique imaging mode for real-time sector scan imaging systems. Efforts are currently under way to demonstrate that some UT noise may be reduced using the motion-averaging capabilities of real-time UT imaging. The next objective of this project will be to evaluate an electronic phased array UT system developed by the Institute fur Zerstorungsfreir Prufverfahren (IzFP), West Germany.

47373 (EPRI-NP—4902-SR, pp 7.1-7.8) **Ultrasonic wave scattering and characterization: centrifugally cast stainless steel.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Centrifugally cast stainless steel materials are widely used in the nuclear industry. Unfortunately, from the point of view of ultrasonic nondestructive testing for detection, location, classification, and sizing of defects, the material is difficult to size because of its anisotropic character. Ultrasonic wave propagation is not as well understood in anisotropic materials as wave propagation in isotropic materials. A numerical computer model is being developed to study wave propagation in anisotropic materials. The model is an extension of an ultrasonic field analysis model used to predict wave propagation in fluids. This new model includes mode conversion concepts at boundaries and considers wave speed a variable, with both position and propagation direction. Of primary concern in this work is the development of procedures to detect, locate, and classify anomalies inside an anisotropic material, and the potential masking effects of the anisotropic filter. A physical model of a reflector embedded in anisotropic half space was developed. A computational philosophy was also established. Progress has been made in understanding the phase velocity profiles as a function of angle for centrifugally cast stainless steel material, the resulting group velocities and beam deviation angle, the mathematics required for generating a point source solution in anisotropic media, the quasi-longitudinal and shear partition function, and the mode conversion principles on the surface of a reflector. Potential problems associated with anisotropic media inspection and possible anomaly classification and imaging were also established.

47374 (EPRI-NP—4902-SR, pp 8.1-8.11) **Modeling ultrasonic inspection of nuclear components: beam models and applications.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Several models for the ultrasonic inspection of pressure vessel weldments have been developed over the past several years by the Central Electricity Generating Board (CEGB) in the United Kingdom. The development of these models has been strongly motivated by the recent U.K. Public Enquiry regarding the safety of the proposed Sizewell B reactor, and the model predictions have played a significant role in the safety case developed by CEGB. Since these models have been prepared with considerable generality, and hence might be applied to many situations of interest to electric utilities in the US, a task was undertaken to review the CEGB work in detail. Included in the Technical Discussion are reviews of the physical principles of the models, reports of successful attempts to install them on their laboratory computer systems, and a discussion of steps that might be taken to transfer them to industrial users.

47375 (EPRI-NP—4902-SR, pp 10.1-10.10) **Evaluation of a new gamma scanning method for detection and sizing of intergranular stress corrosion cracking.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The work to develop and test the new prototype gamma crack detection system began in late 1985. The design concept is based on gamma scans that are made in proximity to the outside surface of the piping. Cracks are detected and sized by characterizing the relative changes that occur in the measured radiation signals along the scan path. The concept is described in more detail in the technical discussion. A major effort of the work so far has been development of the hardware and software needed for the prototype system. The three major items of equipment include the pipe scanner assembly, the data acquisition system, and a data processing system. Software has been developed to remotely control the pipe scanner and the acquisition of the test data. Software is also provided to process and analyze the raw test data for crack detection and sizing. Laboratory and preliminary field testing to date have shown that this new NDE concept is a feasible approach for both detection and sizing of IGSCC during in-service inspection (ISI) of operating BWRs. However, to be useful to the nuclear power industry, additional testing is required to verify the predictions and to qualify the system for use. The remaining effort in this program is to complete the testing necessary to qualify this new approach.

47376 (EPRI-NP—4902-SR, pp 11.1-11.2) **Improved ultrasonic inspection techniques for creviced safe ends.** Smith, T.D. (General Electric Co., San Jose, CA). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

An improved calibration block - together with new ultrasonic testing procedures - enabled Philadelphia Electric Company to detect cracking in the creviced safe ends at Peach Bottom-3. This report describes both the preinspection calibration methodology and the ultrasonic inspections in the field.

47377 (EPRI-NP—4902-SR, pp 12.1-12.12) **Production of Inconel 182 weldments containing interdendritic stress corrosion cracks.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

General Electric Company initially began investigating means of introducing interdendritic stress corrosion cracking in massive Inconel 182 weld deposits under a contract with the EPRI NDE Center. A number of chemical methods operating at temperatures less than 100°C (212°F) were evaluated without success. However, a method of producing cracks in a dissimilar metal insert in the Inconel 182 weld deposit was developed, and the insert was shown to be acoustically invisible to ultrasonic examination. While specimens of this type satisfy the technical development and training needs of the industry, they do not meet the implied criteria of the current Nuclear Regulatory Commission position regarding

procedure and personnel qualification. To meet both the immediate technical need for procedure development specimens and the regulatory requirement for procedure qualification specimens, EPRI RP T301-15 was initiated. This project has produced 1.5-inch thick insert-cracked and 0.75- and 1.5-inch thick BWR environmentally cracked Inconel 182 weldments in dissimilar metal plate material; insert cracks in 60° and 90° segments of 28-inch diameter and 12-inch diameter dissimilar metal pipe mockups; and BWR environmental cracks in a 90° segment of a 12-inch diameter dissimilar metal pipe mockup.

47378 (EPRI-NP—4902-SR, pp 13.1-13.4) **Feature-enhanced imaging.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

This contract was begun in June 1986 and has three major tasks: (1) Interface Ultra Image and TestPro for field ISI (in-service inspection); (2) Interface Ultra Tec and TestPro for field and/or home-base UT data analyses; (3) Conduct of two field ISI trials: one by the system developers, and the other by an ISI services vendor. To date, the first of these tasks is nearly completed. The first field ISI trial is tentatively set for November 1986 at Northern States Power's Prairie Island plant. The significance of this accomplishment is that the basis of an enhanced UT imaging system, Ultra Image/TestPro, is now available. The integrated system will offer utilities the current Ultra Image imaging functions plus the data acquisition, information management, and analysis functions of TestPro. The only addition to the Ultra Image field system is a PC.

47379 (EPRI-NP—4902-SR, pp 14.1-14.4) **Experimental verification of mathematical models for ultrasonic NDT of intergranular stress corrosion cracks.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The project is a recent start in 1986. The first task was to review the basic capabilities of the models under consideration. In evaluating the current version of the analytical model, it was recognized that the most significant modeling result is its prediction that the scattered pulse shape exhibits several peaks corresponding to key geometrical features of the assumed Y-shaped crack. The extractable information would allow for a quantitative determination of crack size and shape. An experimental setup that would most closely simulate the modeling hypotheses is being assembled to establish a laboratory verification of this prediction capability of the analytical model. Once this experimental verification is established, the next step will be to evaluate its utility to field inspections. One should note that the idealized modeling hypotheses include a simplified input pulse, a Y-shaped crack, an isotropic medium, and a Gaussian shear beam incident at 45 degrees. In assessing the utility of this modeling prediction, one should at least consider a number of factors that might cause deviations from the predicted pulse signature, namely, anisotropy of centrifugally cast stainless steel (CCSS), presence of weldment and overlay cladding, and crack surface roughness and complex shape. The present effort also involves a review of existing modeling approaches in the area of crack ultrasonic NDT. The purpose of such a review is to identify the most useful modeling tools that can be developed in a reasonable time frame for use in ultrasonic NDT of IGSCCs. Under consideration are such numerical techniques as finite-element, finite-difference, and ray-tracing, and several analytical formulations. This review activity is in progress.

47380 (EPRI-NP—4902-SR, pp 15.1-15.7) **IntraSpect/2 and IntraSpect/98 enhancements and establishment of rapid field deployment status.** Umino, D.T.; Hersh, S. (Amdata, Inc., San Jose, CA). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The IntraSpect/2 and IntraSpect/98 ultrasonic imaging systems have been interfaced to the TestPro feature-based data analysis system. In addition, the pipe specimens with IGSCC at BPNL have been inspected to measure the growth of cracking since the previous inspection was performed. Significant changes in the circumferential extent of cracking in several welds were observed. Crack depth measurements made using the crack tip diffraction method were also compared with the previous results. A B-scan averaging technique was used to enhance the signal-to-baseline ratio of the tip-diffracted echo. The deepest crack is predicted to be 0.68 inch on one specimen, which had an average propagation of 0.27 inch through-wall compared to the 1985 examination.

47381 (EPRI-NP—4902-SR, pp 17.1-17.6) **PC imaging system for reactor NDE.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

PC-based systems have been given recent attention by EPRI to organize and manage inspection data (RP-2405-15, TestPro system); integrate with larger, mainframe computers to maintain dialogue for on-site and remote applications; and, in this project, to aid the operator in providing guidance to render decisions on the data. The PC system configuration for this project consisted of a central processing unit (CPU), a hard disk and a floppy disk, 640K bytes of system memory, a high-resolution graphics card and compatible color monitor, and a mouse for operator interaction with software. The software package was written in FORTRAN under the PC Disk Operating System (PC-DOS) and utilized a graphics package for image display. Application of this package to crack-counterbore discrimination in piping welds was investigated. Present automatic techniques utilize signal features from single, A-scan data to render a decision on whether the reflector is benign (i.e., counterbore, weld root) or a crack. However, experienced manual operators in the field make reliable decisions based on the integrated response from the reflector as the transducer is scanned past the suspicious region. Since this software package could display and manipulate ensemble A-scans, spatial features - similar to those used by experts - were developed as discriminants. Ultrasonic responses from intergranular stress corrosion cracks (IGSCCs) were discovered to vary both in time-of-flight and in their amplitude, whereas counterbore responses were more consistent. The software package contains methods for viewing and quantifying these spatial features.

47382 (EPRI-NP—4902-SR, pp 18.1-18.24) **Detection of stress corrosion cracks in reactor pressure vessel and primary coolant system anchor studs.** Light, G.M.; Joshi, N.R. (Southwest Research Institute, San Antonio, TX). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Under Electric Power Research Institute (EPRI) contract No. 2179-2, southwest Research Institute is continuing work on the use of the cylindrically guided wave technique (CGWT) for inspecting stud bolts. Also being evaluated is the application of the CGWT to the inspection of reactor coolant pump shafts. Data have been collected for stud bolts ranging from 16 to 112 inches (40.6 to 285 cm) in length, and from 1 to 4.5 inches (2.54 to 11.4 cm) in diameter. For each bolt size, tests were conducted to determine the smallest detectable notch, the effect of thread noise, and the amount of detectable simulated corrosion. The ratio of reflected longitudinal signals to mode-converted signals was analyzed with respect to bolt diameter, bolt length, and frequency parameters. The results of these test showed the following: (1) The minimum detectable notch in the threaded region was approximately 0.05 inch (1.3 mm) for all stud bolts evaluated. (2) Thread noise could easily be detected, but the level of noise was below the minimum detectable notch signal. (3) For carbon steel, optimum transducer frequency was 5 MHz, using a transducer whose face had an impedance that matched the steel surface. (4) Simulated corrosion of 15% reduced diameter could be detected.

47383 (EPRI-NP—4902-SR, pp 19.1-19.4) **Ultrasonic inspection of a steam generator upper shell-to-cone weld using automated inspection and data processing equipment.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The overall objective of this program is to provide a forum for automated inspection and data processing systems. The program is intended to reveal the usefulness and effectiveness of these systems through the field performance of ultrasonic examinations on selected sections of a steam generator upper shell-to-cone closure weld known, from previous manual examinations, to contain ultra-

sonic reflectors. To accomplish this program, approximately 50 inches linear distance of upper shell-to-cone weld at an operating plant site were selected for examination. This area encompasses a segment examined manually in 1983, where several indications were recorded.

47384 (EPRI-NP—4902-SR, pp 22.1-22.9) **Infrared for nondestructive boiler tube inspection.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

In 1985, the first attempt to introduce steam into the waterwall tubes of a Boston Edison boiler failed because steam rising in the tubes did not possess sufficient velocity to move rapidly up the waterwall tubing. In 1986, in a second experiment on another retired boiler, success was achieved, and extensive tube thinning and other damage was observed using computer-enhanced infrared images. The experiment demonstrated conclusively that steam introduced rapidly into waterwall tubing, followed by infrared imaging and appropriate image processing, can rapidly detect virtually all tube thinning over extensive areas of boiler waterwalls and exposed superheaters.

47385 (EPRI-NP—4902-SR, pp 23.1-23.19) **Ultrasonic boiler inspection and economic analysis guidelines.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Boiler tube failures cause approximately 6% availability loss of large fossil-fired power generating plants. This loss can be reduced by systematic approaches using ultrasonic examination and root cause failure analysis methods. Two projects sponsored by EPRI have provided utility engineers with guidelines for performing ultrasonic examinations and with details on 22 types of tube failure mechanisms. A manual has been published that provides descriptions of typical locations, superficial appearances, damage mechanisms, metallurgy, microstructural changes, likely root causes, and potential corrective actions. Application of the principles in the manual is being demonstrated in an EPRI-funded project at 10 electric utilities over the next two years. Guidelines have been published that prescribe the activities necessary for ultrasonic examinations of boiler tubes. Eight essential elements of a boiler examination should be performed to assure that possible economic benefits are obtained. Work was supported by EPRI under RP 1890 and RP 1865. A software package has been developed for effectively planning inspections for wall thinning in fossil-fired boiler tubing. The software assists in minimizing costs associated with maintenance, such as inspection and repair, while the life of the boiler is maximized.

47386 (EPRI-NP—4902-SR, pp 24.1-24.17) **Ferromagnetic material inspection for feedwater heater and condenser tubes.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

In recent years, special ferritic stainless steels, such as AL29-4C/sup TM/, Sea-Cure/sup TM/, E-Brite/sup TM/, 439, and similar alloys have been introduced as tube material in condensers, feedwater heaters, moisture separator/reheaters, and other heat exchangers. In addition, carbon steel tubes are widely used in feedwater heaters and heat exchangers in chemical plants. The main problem with the in-service inspection of these ferritic alloys and carbon steel tubes lies in their highly ferromagnetic properties. These properties severely limit the application of the standard eddy current techniques. The effort was undertaken under EPRI sponsorship to develop a reliable technique for in-service inspection of ferromagnetic tubes. The new method combines the measurement of magnetic flux leakage generated around the defects with measurement of total flux in the tube wall. The heart of the inspection system is a special ID probe that magnetizes the tube and generates signals for any tube defect. A permanent record of inspection is provided with a strip-chart or magnetic tape recorder. The laboratory and field evaluation of this new system demonstrated its very good sensitivity to small defects, its reliability, and its ruggedness. Defects as small as 10% external wall loss in heavy wall carbon steel tube were detected. Tubes in the power plant were inspected at a rate of 300-500 tubes per eight-hour shift. The other advantages of this newly developed technique are its simplicity, low cost of instrumentation, easy data interpretation, and full portability.

47387 (EPRI-NP—4902-SR, pp 25.1) **Preliminary technical assessment of an inflatable inspection probe - phase II.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

A technique used to inspect many types of heat exchanger tubing in power generation equipment employs an eddy current test method. This test method requires that a probe be inserted into and through the tubing. With the objective of having a probe small enough to navigate tubing irregularities and always maintaining probe-to-tube proximity, EPRI Program Manager Gary Dau conceived a device (probe) that utilizes an inflatable, elastic bladder. Owing to its compliant properties, this new device would pass through tube irregularities, yet could keep the eddy current coils near to the internal surfaces of the tubing. Under RP2673-1, Battelle conducted work to evaluate and suggest candidate elastomeric materials to be used as the expandable bladder. The basic materials that were identified: thermoplastic urethane, polyurethane foam, polychloroprene, and polyisoprene. Given these materials and the expandable inspection device, as it was conceptualized at that time, manufacturing processes suitable for production were also evaluated. The likely manufacturing processes to be employed for the production of the expandable device using the suggested materials are cast molding and solution dipping. Work in 1986 involved the evaluation of alternative designs that could be used for the expandable inspection probe. The designs that were ultimately selected and that are compatible with materials and commercial manufacturing processes already identified are presented in the final report on this project.

47388 (EPRI-NP—4902-SR, pp 26.1-26.2) **Signal processing development for steam generator tube inspection.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The goal of the project is the development of signal processing and pattern recognition techniques for the automatic detection of anomalous conditions in steam generator tubing. Multifrequency eddy current field data have been collected and stored using the standard MIZ-18 file format on ADIC tape cartridges. To facilitate signal processing and pattern recognition algorithm development, the above data has been transferred to a Cyber 990 computer using a combination of Combustion Engineering eddy current data analysis software and custom software prepared through this project. VAX 11/750 data are required for use of Fourier descriptor code. FODESC code (developed by Colorado State University) has been compiled and exercised to verify proper implementation. This code will not be used until the second phase of this project, which is automatic anomaly identification.

47389 (EPRI-NP—4902-SR, pp 27.1-27.6) **Verification of EPRI two-dimensional finite element computer code for eddy-current testing.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Recent efforts to predict the response of eddy-current instrumentation to defects in steam generator tubes and support plates include the development of a finite element code (EDDYNDT) at Colorado State University. An updated version of this code (EDDY2D), which guides the user through the process of defining a test case and performs automatic mesh generation for special geometries, was produced by the EPRI NDE Center. EDDY2D is a two-dimensional code that calculates the instrumentation response from rectangular, symmetrical, circumferential flaws in steam generator tubes and is regarded as a powerful numerical tool that can greatly increase the quantitative understanding of eddy-current data interpretation. A user's guide for EDDY2D was prepared to cover the installation and use on a VAX computer under the VMS operating system. An independent task to verify, validate, and document EDDY2D is being performed, and the program capability is being expanded to include a larger variety of flaw geometries (rectangular, triangular, and trapezoidal). As a result, it is intended that the

user will be able to analyze a larger number of flaws, quickly and easily and with more confidence.

47390 (EPRI-NP—4902-SR, pp 28.1-28.11) **New signal processing methods for the evaluation of eddy current NDT data.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Signal processing and pattern recognition methods play a crucial role in a number of areas associated with nondestructive evaluation. Defect characterization schemes often involve mapping the signal onto an appropriate feature domain and using pattern recognition techniques for classification. In addition, signal processing methods are also used to acquire, enhance, restore, and compress data. EPRI Project RP 2673-4 is concerned with developing new signal processing and pattern recognition techniques for evaluating eddy current signals. Efforts under this project have focused on three closely related areas. The thrust has been to: (1) develop a scheme to compress eddy current signals for the purposes of storing them in a compact form, (2) develop a robust clustering algorithm capable of discarding feature vectors that fall in the gray areas between clusters, and (3) investigate the feasibility of designing and developing a digital eddyscope.

47391 (EPRI-NP—4902-SR, pp 29.1-29.16) **Advanced ultrasonic techniques for steam generator tube in-service inspection.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

This report deals with improving ultrasonic imaging techniques of multilayered materials and, in particular, their application in imaging nuclear power plant steam generator tubing. Steam generator tubing consists of an Inconel tube surrounded by a ring steel support plate. Imaging the gap between the tube and support plate is important since nonprotective magnetite can build up on the support plate, which can cause the Inconel tube to dent or fracture. In earlier reports, the ultrasonic backscattered echo signal, applied to the steam generator tube, has been shown to contain two dominant sets of multiple echoes (in terms of signal intensity) that are directly related to the tube and support plate boundaries. The decomposition of these two sets of echoes allows the tube and support plate echoes to be examined, thus revealing the integrity of the Inconel tube and the status of corrosion in the gap. It has been shown that tube echoes can be suppressed by using oblique angle scanning. Presented here are different types of focusing techniques that can be potentially useful in improving the resolution of support plate echoes. In addition, analog and digital echo cancellation techniques have been considered and preliminary experimental results are included. With these techniques, they can detect and characterize the different degrees of corrosion within the gap. Furthermore, experimental results reveal that any distortion and reduction of reverberant tube echoes can be correlated to the severity of the corrosion in the vicinity of the tube wall and to the presence of denting.

47392 (EPRI-NP—4902-SR, pp 31.1-31.4) **Array coil probe design optimization.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

To overcome the limitations of conventional bobbin style eddy-current probes, it has become common practice to perform some portion of a steam generator tube inspection program with array coil probes. Typically, eight surface-riding pancake coils are utilized in a probe head, either as eight independent coils (8 x 1) or in a parallel combination of four serially connected coils (4 x 4). The advantages of the array coils are improved sensitivity to intergranular attack (IGA), reduced interference from tube denting, and improved sensitivity to circumferential cracking. The current status of commercially available probes is such that several weaknesses in array coils have limited the widespread application of this technology. Task S 301-6 was conceived to address each of the weaknesses in order to produce a more reliable and cost-effective probe. The emphasis was on reliability, since the cost associated with downtime for a probe change far exceeds the price of a probe. The array coil probe optimization has progressed to the completion of the prototype stage. A total of seven probes were fabricated in the second stage to inspect two different ranges of tube inner diameters (0.58 to 0.70 in. and 0.66 to 0.78 in.). The probes have a range of 0.12-in. variation on the diameter, and each has eight spring-loaded pancake coils of approximately 1/8-in. diameter. Two size ranges were built in order to validate the design criterion of maximizing the common parts in probes over a wide range of sizes. Several design improvement, have been successfully demonstrated.

47393 (EPRI-NP—4902-SR, pp 32.1-32.3) **EMAT sleeve-end inspection system.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Preliminary work performed by Rockwell International for the Steam Generator Owners Group demonstrated that EMAT (electromagnetic acoustic transducer) technology has potential for inspecting steam generator tubes. The EMAT technology is not subject to the above ET and UT limitations of the parent tube behind the sleeve region. The purpose of this work is to develop a fieldworthy EMAT system for inspection of steam generator sleeves. Further development of the technology may be directed to the U-bends and other areas that are difficult to examine with conventional techniques. In the first phase, a conceptual design and specifications will be developed. This effort will include consultation with experts and companies having special expertise in the physics of EMAT technology and design of EMAT equipment. On the basis of review of competitive bids, either a principal subcontractor will be selected, or B & W will, on its own, establish a conceptual system design. The second phase will consist of designing and building a prototype EMAT system for laboratory evaluation and certification.

47394 (EPRI-NP—4902-SR, pp 35.1-35.10) **Advanced nondestructive evaluation for creep damage.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

As a result of operation at elevated temperatures, power plant components experience creep. Changes in metallurgical structure and microscopic cracking occur after periods of operation and lead to component failure. In order to detect the presence of creep and avoid creep-related failures, EPRI has just initiated a five year program entitled Advanced NDE for Creep Damage (RP 1856-7). The objective of this program is to develop NDE methods for detection and characterization of microscopic creep damage. Several NDE methods will be initially evaluated to determine their potential for detecting and characterizing such damage. These NDE methods include ultrasonics, eddy current, Barkhausen, positron annihilation, and thermal-wave imaging. A prototype system will be developed and tested for commercial applications in a follow-on project, utilizing characteristics of the best NDE method for creep detection. A brief description of the project and results of a theoretical investigation, to determine feasibility of ultrasonic NDE method, for detection of creep damage are presented.

47395 (EPRI-NP—4902-SR, pp 36.1-36.13) **Photothermal radiometric imaging for NDE.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The detection of surface cracks in turbine and generating machinery remains a continuing task. Although several ways of detecting such cracks are in use, equipment failures initiated by surface cracks continue to occur. It has been the task of this project to explore and develop new methods for detecting surface cracks, to enhance the chances of crack detection and thereby minimize equipment failures. Three noncontacting potential NDE techniques have been under investigation: photothermal radiometric imaging (PRI), radiometric emissivity imaging (REI) and optical scanning (OS).

47396 (EPRI-NP—4902-SR, pp 37.1-37.19) **Flexible eddy current coil arrays.** Krampfner, Y.; Johnson, D.P. (Failure Analysis Associates, Palo Alto, CA). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

A novel approach was devised to overcome certain limitations of conventional eddy current testing. The typical single-element hand-wound probe was replaced with a two dimensional array of spirally wound probe elements deposited on a thin, flexible polyimide substrate. This provides full and reliable coverage of the test area and eliminates the need for scanning. The flexible substrate construction of the array allows the probes to conform to irregular part geometries, such as turbine blades and tubing, thereby eliminating the need for specialized probes for each geometry. Additionally, the batch manufacturing process of the array can yield highly uniform and reproducible coil geometries. The array is driven by a portable computer-based eddy current instrument, smartEDDY/sup TM/, capable of two-frequency operation, and offers a great deal of versatility and flexibility due to its software-based architecture. The array is coupled to the instrument via an 80-switch multiplexer that can be configured to address up to 1600 probes. The individual array elements may be addressed in any desired sequence, as defined by the software.

47397 (EPRI-NP—4902-SR, pp 38.1-38.9) **Automation of eddy current system for in-service inspection of turbine and generator rotor bores.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The current project (EPRI-RP-1975-5) is a continuation of activities that began several years ago. Those results (EPRI-RP-1957-1) indicated that eddy current testing shows promise for in-service inspection. The current project investigates the degree to which eddy current testing can be used to replace bore magnetic particle testing. For this purpose, correlation studies between eddy current and magnetic particle tests are being undertaken on laboratory rotor sections and field test pieces of rotors. The eddy current data are to be gathered automatically by a combination of the Nortec-25L Eddyscope (to provide the analog eddy current signals) and the General Electric DATAQ/sup TM/ (a registered trademark of the General Electric Co.) System (to perform the automatic data acquisition). This paper describes some test results on a flaked laboratory rotor section.

47398 (EPRI-NP—4902-SR, pp 39.1-39.22) **Remote inspection of steam turbine blades.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

During the past five years Reinhart & Associates, Inc. has been involved in remote examination of L-0 and L-1 steam turbine blade rows of in-place LP turbines using visual and eddy current techniques. These tests have concentrated on the trailing edge and blade-to-rotor attachment (Christmas tree) areas. These remote nondestructive examinations were performed through hand access ports of the inner shell. Since the remote scanning system was in a prototype configuration, the inspection was highly operator-dependent. Refinement of the scanning equipment would considerably improve the efficiency of the test; however, the feasibility of remote in-place inspection of turbine blades was established. To further improve this technology, and to provide for remote inspection of other areas of the blade and additional turbine designs, EPRI is funding a one-year project with Reinhart & Associates, Inc. This project will develop a new system that employs state-of-the-art multifrequency eddy current techniques, a miniature charged coupled device (CCD) television camera, and remote positioning equipment. Project results from the first six months are presented.

47399 (EPRI-NP—4902-SR, pp 40.1-40.12) **Improvements to the safer rotor life prediction code.** Wells, C.H.; Warnock, A. (Failure Analysis Associates, Palo Alto, CA). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The utility industry has used the SAFER turbine rotor life prediction code for about five years. The experience identified certain difficulties in operation as well as technical deficiencies, which are being addressed in the current program. The improved SAFER code includes procedures for determining the key elements in run/retire decision making, such as boresonic inspection uncertainty and material failure modes under creep-fatigue loading. Special modeling and a material data base have been incorporated for the analysis of generator field lifetime. The operator is provided with a menu of code options and an editor to facilitate review of input data. The fracture mechanics and stress analysis have been critically reviewed and upgraded, and the flexibility of modeling rotor geometry and duty cycles has been enhanced.

47400 (EPRI-NP—4902-SR, pp 41.1-41.10) **Nondestructive evaluation of generator retaining rings.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

This program at the NDE Center is devoted to nondestructive evaluation techniques for generator retaining rings. Efforts in the retaining ring inspection program this year were directed toward reviewing and evaluating existing examination practices and other new and novel techniques. Realistic mockups of the rotor body at the retaining ring fit have been designed for two different retaining ring/rotor configurations. These will be assembled into the appropriate retaining rings for use in evaluating a variety of test techniques and eventually for use in a vendor qualification program. One assembly has been completed at this time. Modifications have been made to several EPRI-developed test systems, and support tools have been made to allow the use of these test systems for experimental retaining ring examinations using the mockups. The evaluation of these test systems and the evaluation of test methods and techniques currently being applied for retaining ring inspections will be completed by the end of this year.

47401 (EPRI-NP—4902-SR, pp 43.1-43.24) **Piping inspection activities at the EPRI NDE center.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

During the past two years, the piping inspection technology group at the NDE Center has concentrated primarily on the examination of weld overlay repaired (WOR) pipe joints. Based on the positive results demonstrated by this program, two utilities have requested continued use of WOR joints in lieu of piping system replacement. One utility has been granted permission to operate for additional cycles with existing overlays. Several other utilities are contemplating similar requests. Repair of the pipe instead of replacement promises to provide substantial cost and radiation exposure savings. Additional activities have included examination of corrosion resistant cladding (CRC), cast stainless steel, and dissimilar metal welds. Application of automated systems to inspection problems has also been a major activity.

47402 (EPRI-NP—4902-SR, pp 44.1-44.12) **Heavy section inspection activities at the EPRI NDE center.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

Nuclear pressure vessels and other heavy section components pose unique problems of nondestructive testing because of their size and the nature of the materials used. The highest levels of effectiveness are required to assure the integrity of these critical components. Major efforts during this reporting period have centered on the characterization of defects. Interest in the detection of under-clad defects has also continued. Principal activities during the past year included the continuing evaluation of the SIGMA SDL-1000 Ultrasonic Holography system; publication of the report of the evaluation of the Dynacon Ultrasonic Data Recording and Processing System (UDRPS); continuation of the near-surface inspection demonstration program; expansion of the heavy section sample base; direct support to member utilities; and rapid response help to both member and nonmember utilities.

47403 (EPRI-NP—4902-SR, pp 45.1-45.11) **Turbine inspection activities at the EPRI NDE center.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

This task of the NDE Center program is devoted to evaluating technology applicable to turbine integrity problems; eventually transferring this technology to utility users; and supplying utilities

with rapid assistance for rotor inspection problems. The majority of the efforts in the turbine inspection task this past year were directed towards evaluating rotor boresonic systems; investigating data interpretation methods; and directly assisting utilities. Rapid response assistance was provided to several utilities to resolve problems in rotor lifetime prediction and rotor bore and disk inspection.

47404 (EPRI-NP—4902-SR, pp 46.1-46.9) **NDE training activities at the EPRI NDE center.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The need for an industry-wide qualification for NDE personnel is becoming more evident in both in-service inspection and technical skills training. ASME Section XI requirements for the qualification and certification of visual, ultrasonic, and eddy current examines is one of the major areas being supported by training at the Center. The other major thrust is in response to the Boiling Water Reactor Owners Group and its recognition of the importance of the UT operator's accurately detecting, discriminating, and sizing intergranular stress corrosion cracks (IGSCC) in piping, and inspecting weld overlay repairs of these cracked pipes. In addition, the pressurized water reactor (PWR) utilities have recognized the importance of improved eddy current data analysis of steam generator tubing. The overall intent of the Center's training is to meet the most critical utility needs with quality training that can be used by the trainee's employer as a part of its certification of that individual. To do this, the Center has organized and activated a carefully maintained documentation and records system built around the Continuing Education Unit (CEU). To address the problem of the small supply of entry-level NDE personnel available to the utilities, the Center has developed, through its Human Resource Development, academic and utility co-op programs to generate guidelines and NDE teaching materials for high schools, technical schools, and universities.

47405 (EPRI-NP—4902-SR, pp 47.1-47.22) **Steam generator inspection activities at the EPRI NDE center.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

This report describes a multi-tasked project under the joint sponsorship of EPRI and EPRI Steam Generator Owners Group II. The overall project objectives include the evaluation and transfer of steam generator tube inspection NDE technology. Including the Center's first offering of the eddy current data analysis course on steam generator tubing in July-August 1985, the data analysis program has been offered six times to a total of 31 students. The students are from seven utilities, four vendors, and the NDE Center. To maximize the effectiveness of the course, a students-to-instructor ratio no greater than seven is typically maintained for each class. The program is fully compatible with the existing hardware/software being used in the industry and can be given in either analog or digital format, depending on the student's selection of eddy current analysis equipment.

47406 (IWGFPT—26) **Properties of materials for water reactor fuel elements and methods of measurement: Proceedings of a technical committee meeting.** (International Atomic Energy Agency, Vienna (Austria). International Working Group on Water Reactor Fuel Performance and Technology). May 1987. 134p. (CONF-8610334—). NTIS (US Sales Only), PC A07/MF A01. File Number DE87900925.

From Technical committee meeting on properties of materials for water reactor fuel elements and methods of measurement; Vienna, Austria (13 Oct 1986).

This report presents information concerning cladding materials, fuel materials, and the influence of material properties on fuel rod behavior. (JDB)

47407 (NIIAR—25(671)) **Distribution of radioactive fission products within the VK-50 NPP circuit when operating with non-failed fuel elements.** Bordachev, V.G.; Vasilishchuk, A.V.; Konyashov, V.V.; Yakshin, E.K. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1985. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703338.

Results of gamma spectrometric measurements of crypton, xenon and iodine radionuclide activities in the reactor water and gaseous effluents from the VK-50 NPP turbine ejector when operating with sealed fuel elements are given. Degree of core surface contamination with nuclear fuel is calculated. Technique for determining coefficients of gaseous fission product distribution between steam and water based on coolant vacuum degassing is described. Minimum values of the distribution coefficients are determined. A conclusion on the absence of marked deposition of iodine radionuclides on the reactor coolant circulation circuit surface is drawn. The obtained coefficients of distribution between steam and water in the VK-50 reactor constitute over 100 for crypton and xenon. 2 references, 2 figures, 3 tables.

47408 (NUREG/CR—4583-Vol.3) **Development and validation of a real-time SAFT-UT [synthetic aperture focusing technique for ultrasonic testing] system for the inspection of light water reactor components: Annual report, October 1985-September 1986.** Doctor, S.R.; Hall, T.E.; Reid, L.D.; Mart, G.A. (Pacific Northwest Lab., Richland, WA (USA); Nuclear Regulatory Commission, Washington, DC (USA). Div. of Engineering). Jul 1987. Contract AC06-76RL01830. 65p. (PNL—5822-Vol.3). NTIS, PC A04/MF A01 - GPO. File Number DE87014674.

The Pacific Northwest Laboratory is working to design, fabricate, and evaluate a real-time flaw detection and characterization system based on the synthetic aperture focusing technique for ultrasonic testing (SAFT-UT). The system is designed to perform in-service inspection of light-water reactor components. Included objectives of this program for the Nuclear Regulatory Commission are to develop procedures for system calibration and field operation, to validate the system through laboratory and field inspections, and to generate an engineering data base to support ASME Code acceptance of the technology. This progress report covers the programmatic work from October 1985 through September 1986. 45 figs., 8 tabs.

47409 (STUK-B-YTO—38) **Operation of Finnish nuclear power plants. 3. Quarterly report 1986.** Lehtinen, P. (comp.). (Finnish Centre for Radiation and Nuclear Safety, Helsinki. Dept. of Nuclear Safety). May 1987. 27p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752510.

Same report has been published in Finnish as STUK-B-YTO--34.

These general reviews of the operation of the Finnish nuclear power plants concentrate on such events and discoveries related to reactor and radiation safety that the regulatory body, the Finnish Centre for Radiation and Nuclear Safety, regards as noteworthy. The report also includes a summary of the radiation safety of the personnel and the environment, as well as tabulated data on the production and load factors of the plants. In the report period, no event essentially degraded plant safety nor posed a radiation hazard to the perssonnel or the environment. For remedying certain defects found in the administrative procedures concerning plant operation and maintenance, the Loviisa power plant was shut down for several days.

2102 Power Reactors, Non-breeding, Light-water Moderated, Non-boiling Water Cooled

REFER ALSO TO CITATION(S) 47344, 47372, 47373, 47374, 47378, 47379, 47380, 47381, 47382, 47383, 47384, 47385, 47386, 47387, 47388, 47389, 47390, 47391, 47392, 47393, 47394, 47395, 47396, 47397, 47398, 47399, 47400, 47402, 47403, 47404, 47405, 47406, 47408, 47409, 47442, 47443, 47446, 47450, 47466, 47469, 47470, 47473, 47484, 47485, 47486, 47487, 47488, 47491, 47492, 47493, 47494, 47495, 47496, 47497, 47498, 47499, 47501, 47502, 47503, 47504, 47505, 47508, 47509, 47510, 47511, 47513, 47514, 47516, 47517, 47518, 47519, 47521, 47522, 47523, 47524, 47525, 47526, 47527, 47528, 47529, 47531, 47532, 47533, 47537, 47539, 47541, 47549, 48137

47410 **(CEA-CONF—8903) Operating reliability of valves in French pressurized water nuclear power plants.** Conte; Boissier, Guillot, Grenet; Vrillon, M.; Cohen, M. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Oct 1986. 8p. (CEA-DAS—304; CONF-860908—43). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752599.

From Operability of nuclear power systems in normal and adverse environments meeting; Albuquerque, NM, USA (29 Sep 1986).

Taking into account the large numbers of valves (about 10000) of a PWR nuclear power plant, the importance of some valves in the safety functions and the cost resulting from their unavailability, the individual operability of these equipments has to be ensured at a high reliability level. This assurance can be obtained by means of an effort at all the stages which contribute to the quality of the product: design, qualification tests, fabrication, tests at the start-up stage, maintenance and tests during the power plant operation, experience feedback. This paper emphasizes more particularly on the tests carried out on loops of qualification.

47411 **(EIR—624) Assessment of interfacial shear and wall heat transfer of RELAP5/MOD2/36.02 during reflooding.** Analytis, G.Th.; Richner, M.; Aksan, S.N. (Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland)). May 1987. 44p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87702887.

The analysis of a number of reflooding and one boil-off experiment in the electrically heated rod bundle NEPTUN at EIR with RELAP5/MOD2/36.02 showed significant differences between measurements and predictions. The same was true for the analysis of two FLECHT-SEASET reflooding experiments. In this work, we shall report on these items and we shall present the modifications made to the frozen version of RELAP5/MOD2/36.02 which eliminate most of the observed discrepancies.

47412 (EPRI-NP—4902-SR, pp 1.1-1.5) **Introduction and summary.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

This introduction describes the format of the reports on specific projects which follow and lists these projects by the inspection technique involved. In addition a program tree is provided.

47413 (EPRI-NP—4902-SR, pp 5.1-5.7) **Ultrasonic characterization of centrifugally cast stainless steel samples.** Gregory M.C.; Zhang, Y.D. (Amdata, Inc., San Jose, CA). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

The program for ultrasonic characterization of centrifugally cast stainless steel (CCSS) involves examining a broad sample set to determine the reliability of ultrasonics to detect and characterize flaws in CCSS piping. As part of this program, Amdata, Inc., participated in the PISC II international round robin. Battelle Pacific Northwest Laboratories (BPNL) conducted this round robin for the purpose of identifying methods that reliably detect flaws in CCSS. Fifteen pipe sections containing weldments made with material representative of PWR piping and one calibration block were inspected in 1985. The samples were provided by Battelle Pacific Northwest Laboratories as part of an international round robin for identifying methods and limitations for reliable detection of flaws in CCSS. Twelve of these samples were received by Amdata for re-examination on August 1, 1986. The other three have been destructively tested at BPNL. The destructive testing was performed for two reasons. The first was to verify the depth and extent of cracking in the samples. The second reason was to try to identify metallurgical reasons for the strong false indications of cracking that were observed in some samples. All of the samples currently being re-examined have had the backing plates removed and light machining performed to clean the inner diameter and outer diameter surfaces. In addition, the samples have been etched to confirm the grain structure. Dye-penetrant examinations were also performed. Four of the samples and the calibration block were ultrasonically imaged. The images of these samples are in agreement with last year's results.

47414 (EPRI-NP—4902-SR, pp 9.1-9.12) **Development of a finite element model for ultrasonic NDT phenomena.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

All nondestructive evaluation techniques rely for their operation on the interaction of some form of energy with the part under test to produce signals that indicate the presence of material inhomogeneities. In particular, the interactions associated with eddy current and ultrasonic NDT methods are governed by parabolic diffusion and hyperbolic wave partial differential equations, respectively, which, from an analytical viewpoint are impossible to solve completely for realistic testing geometries and defect shapes. Numerical code developed under EPRI Project RP 1395-2 has clearly shown the ability of a finite element model to serve as both a simulation and a design tool for the eddy current testing of nuclear power plant components. It is the purpose of this project to determine whether similar code can be used to simulate realistic NDE situations of relevance to the nuclear power industry. Significant progress has been made over the past year on EPRI Project RP 2687-2. Previous work (3 to 5) showed that finite element code could be used to provide a solution to the elastic wave equation. During this reporting period, emphasis has been placed on the development of appropriate transmitter and receiver models and the interaction of ultrasound with simple defect shapes. This 2-D modeling of transducers is significant in that it is a very necessary step in the development of a full 3-D numerical formulation for the simulation of ultrasonic testing situations of importance to the nuclear industry.

47415 (EPRI-NP—4902-SR, pp 30.1-30.6) **PWR steam generator tubing sample library.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920519.

In Nondestructive evaluation program: progress in 1986.

In order to compile the tubing sample library, two approaches were employed: (a) tubing sample replication by either chemical or mechanical means, based on field tube data and metallography reports for tubes already destructively examined; and (b) acquisition of field tubes removed from operating or retired steam generators. In addition, a unique mercury modeling concept is in use to guide the selection of replica samples. A compendium was compiled that summarizes field observations and morphologies of steam generator tube degradation types based on available NDE, destructive examinations, and field reports. This compendium was used in selecting candidate degradation types that were manufactured for inclusion in the tube library.

47416 **(EPRI-NP—5282) Residual and applied stress analysis of an alloy 600 row 1 U-bend: Final report.** Ruud, C.O. (Pennsylvania State Univ., University Park (USA). Materials Research Lab.; Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 160p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920004.

Residual stresses in Inconel alloy 600, row 1, U-bend tubes, used in heat exchanges in nuclear reactors, were studied using an advanced x-ray diffraction instrument. Both axial and circumferential (hoop) stresses on the extrados, intrados, and flanks on the O.D. surface of several U-bends were mapped. The I.D. surface residual stresses at the extrados of the U-bend were mapped on one tube and subsurface stress measurements were made on the I.D. and O.D. surfaces of that tube. Service loads were simulated on one tube to ascertain combined effect of residual and applied stresses. Data from wall thickness and profilometry measurements were also correlated with residual stress measurements. 21 refs., 42 figs.

47417 (IAE—4248/16) Technique and code for calculation of unsteady two-dimensional temperature fields in a cylindrical fuel element. Mysenkov, A.I.; Belyukin, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1986. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702892.

An effective difference scheme is developed for calculating temperature fields in a fuel element agreeing with an accurate solution of the heat transfer equation with piecewise constant coefficients in a one-dimensional case and giving correct values of heat flux going from a wall towards coolant. A method for calculating temperature fields is described. The MAIVA code meant for calculations of nonstationary two-dimensional temperature fields in a cylindrical fuel element of a WWER type reactor is described. The code can be used both independently and as a module in program packages. 4 refs.; 6 tabs.

47418 (IAE—4283/2) Antineutrino flux from power reactor. Korovkin, V.A.; Kodanev, S.A.; Panashchenko, N.S. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1986. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702896.

Neutrino experiment set-up at a reactor a flux magnitude, spectral composition and time history of fluc ν/sub e/ should be well-known. The values defining the antineutrino flux are considered, and they are estimated as applied to the WWER/sub 4/40 reactor (Rovno NPP). 17 refs.; 2 figs.

47419 (INIS-mf—10706, pp 1-5) Operating experience gained with the Krsko nuclear power plant. Dular, J. 1986. (In German). NTIS (US Sales Only), PC A16/MF A01. File Number DE87752788. (CONF-8605275—).

From VGB special meeting on Yugoslavia; Bled, Yugoslavia (14 May 1986).

The author deals with the results of the operating experience gained with the Krsko nuclear power plant throughout an operating period of 4 years. The author examines the operational behaviour of the plant like availability, operating time, and emergency downtimes, explains maintenance/repair and inspection activities and the operating experience with the nuclear power plant, and comments on the control of radionuclide release to the environment. (HAG).

47420 (INIS-mf—10956, pp 47) Post-loca shielding design review for the Koeberg nuclear power station. Jeffrey, G.A.; Lockridge, J.R.; Woody, N.D.; Sartori, D.; Van Rooyen, J. (Electricity Supply Commission, Melkbosstrand, South Africa. Koeberg Nuclear Power Station; Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

47421 (ORNL/TM—10071/R1) Cost estimate guidelines for advanced nuclear power technologies. Hudson, C.R. II. (Oak Ridge National Lab., TN (USA)). Jul 1987. Contract AC05-84OR21400. 105p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE88000027.

To make comparative assessments of competing technologies, consistent ground rules must be applied when developing cost estimates. This document provides a uniform set of assumptions, ground rules, and requirements that can be used in developing cost estimates for advanced nuclear power technologies.

2103 Power Reactors, Non-breeding, Graphite Moderated

REFER ALSO TO CITATION(S) 47465, 47471, 47474, 47477, 47478, 47479, 47537, 48129

2104 Power Reactors, Non-breeding, Otherwise Moderated Or Unmoderated

REFER ALSO TO CITATION(S) 47489, 47490, 47542, 47543, 47544, 47545

2105 Power Reactors, Breeding

REFER ALSO TO CITATION(S) 47472, 47535, 47537, 47538, 47540, 47547

47422 (IAE—4259/4) Performance of nuclear fuel breeding in fast sodium reactors with heterogeneous cores. Alekseev, P.N.; Zhukova, O.A.; Zverkov, Yu.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1986. 9p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702893.

The dependence of breeding performance (a breeding ration, a breeding gain, excess fuel production in a system of fast reactors, fuel doubling time) on the relation of an oxide and a metal fuel fractions in the heterogeneous core of the fast reactor and typical geometrical dimensions of the oxide modules located inside the metallic fassils is analyzed. Some parameters responsible for reactor operation safety - the sodium void coefficient of reactivity and the doppler component of the power coefficient of reactivity, are considered. 6 refs.; 4 figs.

47423 (NIIAR—14(695)) Results of the PG-2 steam generator life tests at the BOR-60 reactor. Thermal and hydrodynamic characteristics under steady and transient conditions. Nikol'skij, R.V.; Sroelov, V.S.; Chernobrovkin, Yu.V.; Borisyuk, V.A.; Britov, V.N.; Nechaev, B.N. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1986. 43p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703335.

The results of the cocurrent sodium/water steam generator on which basis its operating characteristics under steady and transient conditions are presented and the features of thermal and hydrodynamic processes upon steam generation in straight multi-tube bundles have been identified. Safe conditions for heating up, start-up and shutdown of the steam generator are selected. The hydrodynamic steam generator stability has been checked in the 20-100% loading range. The absence of substantial nonuniformities of temperature fields over the cross section of tube bundles and on the vessels surface is experimentally confirmed. The moisture removal from the evaporator tubes owing to thermodynamic disbalance of steam flow is investigated. The conditions of superheating in the evaporator (not below 50 deg C) excluding the moisture filling-up into the steam superheater is formulated. Estimations of thermal shocks under the conditions with complete loss of feed water and sodium flow are made. 10 references, 21 figures.

47424 (NIIAR—30(676)) Study on the performance of fuel elements with carbide and carbide-nitride fuel. Golovchenko, Yu.M.; Davydov, E.F.; Maershin, A.A. (Tsentral'nyj Nauchno-Issledovatel'skij Inst. Informatsii i Tekhniko-Ehkonomicheskikh Issledovanij po Atomnoj Nauke i Tekhnike, Moscow (USSR)). 1985. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703339.

Characteristics, test conditions and basic results of material testing of fuel elements with carbide and carbonitride fuel irradiated in the BOR-60 reactor up to 3-10% burn-up at specific power rate of 55-70 kW/m and temperatures of the cladding up to 720 deg C are described. Increase of cladding diameter is stated mainly to result from pressure of swelling fuel. The influence of initial efficient porosity of the fuel on cladding deformation and fuel stoichiometry on steel carbonization is considered. Utilization of carbide

and carbonitride fuel at efficient porosity of 20% at the given test modes is shown to ensure their operability up to 10% burn-up. 11 references, 8 figures, 4 tables.

47425 **(TBAK/RMR—5530/10.5) The standard Harwell Carbon Meter: Revision.** Asher, R.C.; Harper, D.C.; Kirstein, T.B.A. (UKAEA Atomic Energy Research Establishment, Harwell. Instrumentation and Applied Physics Div.). Nov 1986. 5p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87900965.

This paper gives some operational notes for the Harwell Standard Carbon Meter. The meter was developed to measure the thermodynamic carbon activity of liquid sodium in an LMR. A brief description of the unit is given along with preferred operating conditions. (JDH)

47426 **(UJV—7682-T) Two-dimensional multigroup finite element calculation of fast reactor in diffusion approximation.** Schmid, J. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)). Jun 1986. 75p. (In Czech). NTIS (US Sales Only), PC A04/MF A01. File Number DE87703045.

When a linear element of triangular shape is used the actual finite element calculation is relatively simple. Extensive programs for mesh generation were written for easy inputting the configuration of reactors. A number of other programs were written for plotting neutron flux fields in individual groups, the power distribution, spatial plotting of fields, etc. The operation of selected programs, data preparation and operating instructions are described and examples given of data and results. All programs are written in GIER ALGOL. The used method and the developed programs have demonstrated that they are a useful instrument for the calculation of criticality and the distribution of neutron flux and power of both fast and thermal reactors. (J.B.).

2106 Power Reactors, Auxiliary, Mobile, Package, And Transportable

REFER ALSO TO CITATION(S) 47309

47427 **(ORNL/TM—10467) Review of diffusion barrier technology for application in SP-100 fuel pins.** Schmidt, M.A.; Kania, M.J. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 16p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000021.

The fuel pin design for the SP-100 reactor uses uranium nitride fuel contained in a niobium alloy (Nb-1Zr) cladding. Chemical reactions occur between the fuel and the cladding at the planned operating temperatures of 1350 to 1500 K, so a diffusion barrier is required to prevent degradation. The technology associated with diffusion barriers in similar fuel pins is reviewed to identify fabrication techniques and to summarize previous results of chemical compatibility and irradiation tests. Four fabrication techniques were identified. In previous tests, diffusion barriers have performed successfully for up to 12,000 h at cladding temperatures near 1300°K. A significant challenger remains to develop and qualify a diffusion barrier for the SP-100 mission application, which has a lifetime greater than 60,000 h.

2107 Regulation And Licensing

REFER ALSO TO CITATION(S) 47933

2108 Economics

REFER ALSO TO CITATION(S) 47421

47428 (INIS-mf—10706, pp 1-25) **Planning and construction of nuclear power plants in Yugoslavia.** Bernot, N. 1986. (In German). NTIS (US Sales Only), PC A16/MF A01. File Number DE87752788. (CONF-8605275—).

From VGB special meeting on Yugoslavia; Bled, Yugoslavia (14 May 1986).

The author deals with the development of nuclear energy based on the conditions of the energy economy of Yugoslavia. The tender procedure and the selection of partners abroad are explained. An agreement is described which regulates the cooperation between Yugoslavia's eight electricity utilities. The provision of funds for the implementation of tenders is presented, and the construction of the Prevlaka nuclear power plant, international tenders, assessment of offers and the basic conept of project implementation are examined. (HAG).

47429 (INIS-mf—10706, pp 1-7) **Possible scope of international cooperation in the planning and construction of nuclear power plants and systems.** Palmgren, A. (Imatran Voima Oy, Helsinki, Finland). 1986. (In German). NTIS (US Sales Only), PC A16/MF A01. File Number DE87752788. (CONF-8605275—).

From VGB special meeting on Yugoslavia; Bled, Yugoslavia (14 May 1986).

The author deals with the possible scope of international cooperation in the implementation of various nuclear power plant projects. He explains imbalances in the economic situations of countries while pointing to developing countries in particular, and arrives at conclusions which consider both the difficulties and possibilities of an international cooperation in the planning and construction of nuclear power plants. (HAG).

22 NUCLEAR REACTOR TECHNOLOGY

2201 Theory And Calculation

REFER ALSO TO CITATION(S) 47483, 47512

47430 **(FEI—1784) MMKENG code set to calculate radiation energy release in reactor cores and shields.** Ovchinnikov, A.V.; Polevoj, V.B.; Leont'ev, V.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1986. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702889.

A MMKENG code set providing for successive calculations by the Monte-Carlo method of neutron and gamma-quantum energy depostion using 26-group neutron and 15-group gamma-kerma factors is described in brief. Radiation transmission through zones with considerable attenuation of neutrons and gamma radiation is simulated using the "splitting-reel" method on the surfaces of geometrical zones. 13 refs.

47431 **(ITEF—147-1986) Method for calculating efficient boundary condition on a cylindrical cell surface for the flux first asymuthal harmonic.** Kvaratskheli, A.Yu. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 23p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703288.

Method for calculating the first azimuthal component of the efficient boundary condition on a reactor cylindrical cell surface is presented using the one-velocity approximation. As compared to the earlier developed approaches the described algorithm permits to consider the problem on a block placed in an infinite homogeneous absorbing medium and can be used in a few-group calculational scheme. The DIPOL program prepared using the suggested method is highly accurate and quick-acting. 10 refs.; 2 figs.

47432 **(TR—34) One dimensional benchmark calculations using diffusion theory.** Ustun, G.; Turgut, M.H. (Cekmece Nuclear Research and Training Center, Istanbul (Turkey)). 1986. 34p. (In Turkish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703348.

This is a comparative study by using different one dimensional diffusion codes which are available at the Nuclear Engineering Department. Some modifications have been made in the used codes to fit the problems. One of the codes, DIFFUSE, solves the neutron diffusion equation in slab, cylindrical and spherical geometries by using Forward elimination- Backward substitution technique. DIFFUSE code calculates criticality, critical dimensions and critical material concentrations and adjoint fluxes as well. It is used

for the space and energy dependent neutron flux distribution. The whole scattering matrix can be used if desired. Normalisation of the relative flux distributions to the reactor power, plotting of the flux distributions and leakage terms for the other two dimensions have been added. Some modifications also have been made for the code output. Two benchmark problems have been calculated with the modified version and the results are compared with BBD code which is available and uses same techniques of calculation. Agreements are quite good in results such as k-eff and the flux distributions for the two cases studies.

2202 Components And Accessories

REFER ALSO TO CITATION(S) 47452, 47462, 47463, 47468, 47483, 47500, 47512, 47534, 48096

47433 **(CEA-R—5376) Review of analysis methods to prevent thermal buckling.** Moulin, D.; Combescure, A.; Acker, D. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Inst. de Recherche Technologique et de Developpement Industriel (IRDI)). Dec 1986. 92p. (In French). NTIS (US Sales Only), PC A05/MF A01. File Number DE87752579.

This report is a State of the Art about practical methods to analyze buckling risks mainly due to thermal stresses in slender shell structures. A critical review of theoretical, numerical and experimental results available in open literature till 1986 is performed. They are particularly examined from the point of view of simplicity in the formulations and experimental validation. The final aim of this study is an attempt to propose analysis method of practical use for engineers. Most of used informations were obtained from aeronautic and nuclear (fast breeder reactors) domains.

47434 **(EPRI-NP—5396) Intergranular corrosion mechanisms of alloy 600: Final report.** Helie, M.; Santarini, G. (Electric Power Research Inst., Palo Alto, CA (USA); CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Section d'Etude de la Corrosion Aqueuse). Aug 1987. 118p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920577.

Some sections of alloy 600 steam generator tubes were cut in order to perform various analyses on samples that had undergone Intergranular Attack (IGA) or Intergranular Stress Corrosion Cracking (IGSCC). Micrographs of polished cross sections were taken showing in some cases intergranular penetrations of more than 200 micrometers (16% of wall thickness). Electron microprobe analyses on these samples indicated a decrease in chromium, nickel and iron concentration at the corroded grain boundaries as well as the presence of oxygen, sulfur and sodium in the same areas. Direct examinations and analyses of corroded grain surfaces were also carried out by scanning electron microscopy (SEM) and Auger electron spectroscopy (AES). The SEM examination of these intergranular surfaces showed the presence of a thin layer partially covering the IGA and IGSCC grains. This layer has not been fully characterized but AES analyses indicated the presence of oxygen, silicon and sulfur. Autoclave tests were also carried out on alloy 600 heats in pure NaOH and in NaOH + Na_2SO_4 solutions at 350°C with an overpressure of hydrogen. The aim of these experiments was to clarify the influence of impurities (in the alloy and in the solution) on IGA processes. These experiments were performed using tube sections and coupons of commercial grade alloy 600, both stressed and unstressed, and U-bend for the high purity specimen. Chromium sesquioxide was also added to the testing solution in some cases. The results of these tests showed that in pure caustic solution IGA had occured only on the stressed samples, and was enhanced by the presence of sodium sulfate and chromium sesquioxide.

47435 **(EPRI-NP—5416) Turbine protection system evaluation: Final report.** Lee, R.A.S.; Campbell, M.C. (Foster-Miller, Inc., Waltham, MA (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 177p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920015.

Databases from operating nuclear power plants indicate that malfunction of the turbine protection system (TPS) initiates a significant number of spurious plant transients. Most such transients result in reactor shutdowns, thereby reducing plant availability and adversely affecting the thermal cycle life of plant pressure boundary components. Improved nuclear power plant availability can result from reducing false-alarm emergency plant shutdowns initiated by faulty turbine protection systems. Analyses suggest that potentially corrective retrofit actions can provide significant cost-benefits while helping utilities achieve scram reduction goals. This report determines the magnitude and cost impact of lost plant availability due to TPS malfunctions, identifies the root causes of the equipment malfunctions, and determines appropriate corrective actions and develops methods of evaluating their cost-effectiveness and assessing the potential effects on plant licensing.

47436 **(NUREG/CR—4760) Test of 6-in.-thick pressure vessels: Series 3, Intermediate test vessel V-8A: Tearing behavior of low-upper-shelf material.** Bryan, R.H.; Bass, B.R.; Bolt, S.E.; Bryson, J.W.; Merkle, J.G.; Nanstad, R.K.; Robinson, G.C.;. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research; Oak Ridge National Lab., TN (USA)). May 1987. Contract AC05-84OR21400. 403p. (ORNL—6187). NTIS, PC A18/MF A01 - GPO. File Number DE87014885.

Tests of several 152-mm-thick vessels were performed to study the behavior of flaws under stress states similar to those in full-scale reactor pressure vessels. The objective of the latest test, V-8A, was to provide accurate quantitative data concerning the growth by ductile tearing and the final ductile tearing instability of a flaw in a low upper-shelf toughness weld located in a cylinder of reactor vessel steel. This test is important because vessels are in service that contain welds that, because of high-copper content, may have their Charpy upper-shelf energy values reduced to relatively low levels by neutron irradiation. Results of the V-8A test are intended to provide an experimental basis for judging the accuracy of vessel fracture safety analysis procedures for low-upper-shelf toughness conditions. The objective of the V-8A test was attained. A tearing instability was observed at a pressure of ~139 MPa (about two times the design pressure). The flaw, which was initially a fatigue-sharpened notch with an approximately elliptical profile, grew in depth and length to 101.4 and 453 mm, respectively. Pretest and posttest fracture mechanics and stress analyses were made by simplified methods, convenient for investigating a wide range of parameters, and by three-dimensional finite-element methods, which modeled the material properties and geometry more precisely. Ductile flaw growth and instability predictions based upon measured J-resistance and tensile properties were made. Results of analyses based on J/sub R/-controlled crack growth agree reasonably well with experimental observations. 141 refs., 49 figs., 30 tabs.

47437 **(NUREG/CR—4943) Preparation of design specifications and design reports for pumps, valves, piping, and piping supports used in safety-related portions of nuclear power plants.** Rodabaugh, E.C.; Moore, S.E. (Oak Ridge National Lab., TN (USA); Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Jun 1987. Contract AC05-84OR21400. 75p. (ORNL/TM—10425). NTIS, PC A04/MF A01 - GPO. File Number DE87011927.

Section III of the ASME Boiler and Pressure Vessel Code requires the preparation of Design Specifications and Design Reports as part of the design process leading to construction of a nuclear power plant, in compliance with provisions of Title 10 of the Code of Federal Regulations (10 CFR). Guidelines for preparing this documentation are contained in nonmandatory Appendixes B and C of the ASME Code. This report gives an in-depth review of the ASME Code requirements and guidance, beginning with the first edition of the Code in 1963 through the 1983 edition, Summer 1985 Addenda. Recommendations for substantial revisions to the Code are presented based on the authors experience in conducting design documentation audits of pumps, valves, piping, and piping supports for nuclear power plants undergoing Nuclear Regulatory Commission (NRC) review for Operating Licenses. It is concluded that adequate Design Specifications and Design Reports are absolutely necessary for the normal operating life of a plant and are vital if plant life extension is planned.

47438 **(NUREG/CR—5007) Prediction and mitigation of erosive-corrosive wear in secondary piping systems of nuclear power plants.** Keck, R.G.; Griffith, P. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Mechanical Engineering; Nuclear Regulatory Commission, Washington, DC (USA). Div. of Engineering). Sep 1987. 43p. NTIS, PC A03/MF A01 - GPO. File Number DE88900001.

This report presents equations and parametric curves to predict erosive-corrosive wear rates in low carbon steel secondary piping systems of nuclear power plants. Two mechanisms causing the wear are identified and analytic expressions to predict the wear are presented. One mechanism, wear due to oxide dissolution, is present in single and two-phase flow lines; the other, wear by droplet impact induced fatigue, is only applicable for two-phase flows. Parametric curves are presented to predict the dissolution wear as a function of temperature, pH and characteristics (friction) velocity. An algebraic expression is used for droplet impact wear predictions as a function of superficial gas velocity and thermodynamic quality. Four mitigation strategies incorporated into the models (alloying, pH increase, moisture removal and velocity decrease) are introduced and the effectiveness of each is discussed. The models' wear predictions are not expected to be quantitatively exact, but should yield accurate qualitative rankings of systems susceptible to erosive-corrosive damage.

2203 Fuel Elements

REFER ALSO TO CITATION(S) 47466

2204 Control Systems

REFER ALSO TO CITATION(S) 47534, 47550, 48094

47439 **(CONF-870832—3) Incorporating "fuzzy" data and logical relations in the design of expert systems for nuclear reactors.** Guth, M.A.S. (Oak Ridge National Lab., TN (USA); Oak Ridge Associated Universities, Inc., TN (USA)). 1987. Contract AC05-84OR21400. 9p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014410.

From Topical meeting on artificial intelligence and other innovative computer applications in the nuclear industry; Snowbird, UT, USA (31 Aug 1987).

This paper applies the method of assigning probability in Dempster-Shafer Theory (DST) to the components of rule-based expert systems used in the control of nuclear reactors. Probabilities are assigned to premises, consequences, and rules themselves. This paper considers how uncertainty can propagate through a system of Boolean equations, such as fault trees or expert systems. The probability masses assigned to primary initiating events in the expert system can be derived from observing a nuclear reactor in operation or based on engineering knowledge of the reactor parts. Use of DST mass assignments offers greater flexibility to the construction of expert systems.

47440 **(CONF-871013—4) Fast Flux Test Facility noise data management.** (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 8p. NTIS, PC A02. File Number DE87014058.

From 5. SMORN: international conference on reactor noise; Munich, F.R. Germany (12 Oct 1987).

An extensive collection of spectra from an automated data collection system at the Fast Flux Test Facility has features from neutron data extracted and managed by database software. Inquiry techniques, including screening, applied to database results show the influences of control rods on wideband noise and, more generally, abilities to detect diverse types of off-normal noise. Uncovering a temporary 0.1-Hz resonance shift gave additional diagnostic information on a 13-Hz mechanical motion characterized by the interference of two resonances. The latter phenomenon is discussed generically for possible application to other reactor types.

47441 **(DOE/NE/37959—8) Results and interpretation of multivariate autoregressive analysis applied to the LOFT [Loss-of-Fuel Test] reactor process noise data.** Gloeckler, O.; Upadhyaya, B.R. (Tennessee Univ., Knoxville (USA). Dept. of Nuclear Engineering). 1987. Contract AC02-86NE37959. 11p. (CONF-871013—3). NTIS, PC A02. File Number DE87013658.

From 5. SMORN: international conference on reactor noise; Munich, F.R. Germany (12 Oct 1987).

Multivariate noise analysis of power reactor signals is useful for characterizing baseline operation and plant diagnostics, for isolating process anomaly from sensor maloperation, and for automated plant monitoring. We have developed a systematic and reliable procedure of accomplishing these tasks by improving upon the previously established techniques of empirical modeling of fluctuation signals in power reactors. The application of the algorithm to data from the Loss-of-Fluid Test (LOFT) reactor showed that earlier results (based on physical modeling) regarding the perturbation sources in a pressurized water reactor (PWR) affecting coolant temperature and neutron power fluctuations can be explained using multivariate autoregressive (MAR) analysis. This methodology has important implications regarding plant diagnostics, and system or sensor anomaly detection.

47442 **(DOE/NE/37959—11) Empirical modeling of steady-state behavior of linear and nonlinear systems with application to signal validation: Topical report.** Frei, Z.; Upadhyaya, B.R. (Tennessee Univ., Knoxville (USA). Dept. of Nuclear Engineering). Aug 1987. Contract AC02-86NE37959. 41p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000066.

An automated algorithm for fitting an optimal nonlinear model to predict critical reactor signals has been developed. Additional numerical tests and sensitivity analysis will be performed as part of the continuing work. Numerical studies using plant data from Millstone-3 PWR will be performed in detail. The software is modular in nature and contains good flexibility suitable for numerical studies. The modular architecture of the software allows easy interface with the general signal validation system.

47443 **(EPRI-NP—5389) User's guide for signal validation software: Final report.** Swisher, V.I. (Performance Associates, Inc., Rocky Hill, CT (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 186p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920007.

Northeast Utilities has implemented a real-time signal validation program into the safety parameter display systems (SPDS) at Millstone Units 2 and 3. Signal validation has been incorporated to improve the reliability of the information being used in the SPDS. Signal validation uses Parity Space Vector Analysis to process SPDS sensor data. The Parity Space algorithm determines consistency among independent, redundant input measurements. This information is then used to calculate a validated estimate of that parameter. Additional logic is incorporated to compare partially redundant measurement data. In both plants the SPDS has been designed to monitor the status of critical safety functions (CSFs) and provide information that can be used with plant-specific emergency operating procedures (EOPs). However the CSF logic, EOPs, and complement of plant sensors vary for these plants due to their different design characteristics (MP2 - 870 MWe Combustion Engineering PWR, MP3 - 1150 MWe Westinghouse PWR). These differences in plant design and information requirements result in a variety of signal validation applications.

47444 **(FEI—1780) Computerized system for studies on creep of irradiated materials in the BR-10 reactor. Control system for electric motor.** Fazkullin, V.A.; Kruglov, A.S. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1986. 13p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702888.

A system providing programmed control of a three-phase synchronous electric motor is described. The system enables to control the rotational speed in the 0-600 rev./min when angular po-

sition is preadjusted. It is supplied with technical means for controlling the rotor angular position, torque and number of revolutions. The system can be used as a subsystem of an automatic-control system. 4 refs.; 3 figs.; 1 tab.

47445 **(NUREG/CR—4577) Automated long-term surveillance of a commercial nuclear power plant.** Smith, C.M.; Gonzalez, R.C. (Oak Ridge National Lab., TN (USA); Tennessee Univ., Knoxville (USA); Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Aug 1987. Contract AC05-84OR21400. 64p. (ORNL/TM—10015). NTIS, PC A04/MF A01 - GPO. File Number DE87014110.

This report presents and describes a pattern recognition system for monitoring nuclear reactor signals. The system is based on detecting deviations from baseline signatures identified during normal plant operation. The capabilities and limitations of this pattern recognition approach were investigated during a 2-1/2-year series of continuous online experiments at the Sequoyah-1 Nuclear Power Plant.

2205 Environmental Aspects

REFER ALSO TO CITATION(S) 47472, 47480, 47481, 47483, 47484, 47484, 47485, 47487, 47488, 47489, 47490, 47491, 47492, 47493, 47494, 47495, 47496, 47497, 47498, 47499, 47500, 47501, 47502, 47503, 47504, 47505, 47506, 47507, 47508, 47509, 47510, 47511, 47512, 47513, 47514, 47515, 47516, 47517, 47518, 47519, 47520, 47521, 47522, 47523, 47524, 47525, 47526, 47527, 47528, 47529, 47530, 47531, 47532, 47549, 48409

47446 **(CEA-CONF—8902) Comparison of European computer codes relative to the aerosol behavior in PWR containment buildings during severe core damage accidents.** Fermandjian, J.; Lhiaubet, G.; Dunbar, I.; Bunz, H.; Beonio-Brocchieri, F. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Sep 1986. 7p. (CEA-DAS—303; CONF-860952—4). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752598.

From 2. international aerosol conference; Berlin, F.R. Germany (22 Sep 1986).

The present study concerns a comparative exercise, performed within the framework of the Commission of the European Communities, of the computer codes used in reactor safety in order to assess their capability of realistically describing the aerosol behavior in PWR reactor containment buildings during severe accidents. The codes included in the present study are the following: AEROSIM-M, AEROSOLS/Bl, CORRAL-2, NAUA Mod5. In AEROSIM-M, AEROSOLS/Bl and NAUA Mod5, the integro-differential equation for the evolution of the particle mass distribution is approximated by a set of coupled first order differential equations. To this end, the particle distribution function is replaced by a number of discrete monodisperse fractions. The CORRAL-2 has an essentially empirical basis (processes not explicitely modelled, but their net effects accounted for). The physical processes taken into account in the codes are shown finally.

47447 (EPRI-EA—5202, pp 2.1-2.11) **Cooling ponds and small rivers in north central United States.** Howe, P.H. (Commonwealth Edison Co., Chicago, IL). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

An attempt is made to review those Commonwealth Edison (Ceco) programs related directly or indirectly to compensation and stock manipulation in fish populations. The direct stocking of sport fish fingerlings for mitigation is one method of stock manipulation. There are, however, two other, less common manipulative approaches to enhancing local fish stocks. First is the use of cooling ponds as off-stream nursery areas for forage and sport species. Second is the use of waste heat to modify habitat temperatures and permit or improve overwintering survival of select species such as gizzard or threadfin shad in north-temperate waters that are naturally too cold to sustain strong populations. This, in turn, will increase the abundance of these species as forage in subsequent years. There are four different Ceco projects which are discussed. These are: Fish releases in Pool 14 of the Mississippi River; Studies of endemic and stock fishes at the Collins and Dresden Cooling Ponds; Fish and water quality monitoring of the Des Plaines and Upper Illinois Rivers; and Proposed walleye, muskellunge and striped bass x white bass hybrid stocking in the Rock River. 7 references.

47448 (EPRI-EA—5202, pp 5.1-5.56) **Assessing power plant impacts on fish populations at Northeast Utilities sites: winter flounder studies at Millstone Nuclear Power Station.** Lorda, E.; Danila, D.J.; Miller, J.D.; Bireley, L.E.; Jacobsen, P.M. (Northeast Utilities Environmental Lab., Waterford, CT). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

An historical view is presented of the various impact assessment approaches used to study the winter flounder, including efforts to identify and quantify compensation and to model its population dynamics. This review illustrates the need for unbiased estimates of basic life history parameters and power plant related mortalities if compensatory mechanisms are to be understood and if impact assessments are to be meaningful. 67 references, 19 figures, 10 tables.

47449 (INIS-mf—10956, pp 37) **Proposal for the detection and tomographic reconstruction of a released radioactive cloud.** Strydom, R. (Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

47450 (NUREG/CP—0078, pp 1.21-1.40) **In-plant chemical phenomena potentially important to nuclear reactor severe accidents and their source terms.** Niemczyk, S.J. (Gull Associates, Washington, DC). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

The importance of chemical phenomena potentially occurring during nuclear reactor severe accidents has become increasingly apparent in the past few years as the result of insights gained from experimental studies of such phenomena, from theoretical analyses of postulated accidents, and from data gathered from actual accidents such as the Chernobyl accident. Chemical phenomena can significantly affect not only the chemical forms of any radioactive releases to the environment, but can also affect the magnitudes of such releases and can even dramatically affect the overall progression of some accidents. Chemical phenomena can even impact whether the reactor containment structure fails during an accident. An essentially infinite spectrum of chemical reactions can occur during nuclear reactor severe accidents, ranging from reactions which will not affect either the radioactive releases or the accident progression to reactions which may significantly impact either or both. Severe accident chemistry is in its infancy as a science, with most of the important advances having been made in the last few years. Many potentially important problems remain unresolved.

47451 (PNL-SA—14225, pp 101-153) **Measurement of particle losses in nuclear reactor airborne radiation monitors.** Pence, D.T.; Birkhauser, G.J. (Science Applications International Corp., San Diego, CA). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

Procedures and equipment used to measure particle loss in power reactor airborne radiation monitor sampling lines are described. The variables involved that govern the particle losses in the sampling lines are discussed. The qualitative results of measure-

ments performed at various number power plants are also presented and discussed.

2206 Research, Test, And Experimental Reactors

REFER ALSO TO CITATION(S) 47440, 47441, 47444, 47467, 47506, 47507, 47520

47452 **(HEDL-SA—3448-FP) The examination of an electromagnetic sampling pump from FFTF [Fast Flux Test Facility] primary circuit.** Brehm, W.F.; Grygiel, M.L.; Lutton, J.M.; Young, M.W. (Hanford Engineering Development Lab., Richland, WA (USA)). 18 Nov 1985. Contract AC06-76FF02170. 42p. (CONF-860311—16). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014374.

From Nuclear power plant maintenance meeting; Salt Lake City, UT, USA (23 Mar 1986).

On November 16, 1984 a leak was discovered in the Fast Flux Test Facility (FFTF) Primary Sodium Sampling System electromagnetic pump. The leak was discovered in the course of routine cell entry to investigate a shorted trace heat element. The purpose of this paper is to describe the circumstances surrounding the occurrence of the leak, the process involved which caused the leak and efforts taken to minimize their effects on future operation of electromagnetic pumps at FFTF. The relative ease of recovery from this incident is indicative of the overall feasibility of the LMR concept.

47453 **(HEDL-SA—3563-FP) Evaluation of a twelve-hour/day shift schedule.** Lewis, P.M.; Swaim, D.J. (Pacific Northwest Lab., Richland, WA (USA); Hanford Engineering Development Lab., Richland, WA (USA)). 18 Jun 1986. Contract AC06-76FF02170. 19p. (CONF-8609105—8). NTIS, PC A02/MF A01; GPO Dep. File Number DE87014364.

From Annual meeting of the Human Factors Society; Dayton, OH, USA (30 Sep 1986).

In April 1985, the operating crews at the Fast Flux Test Facility near Richland, Washington, changed their rotating shift schedule from an 8-hour to a 12-hour a day work schedule. The primary purpose of the change was to reduce the attrition of operators by increasing their job satisfaction. Eighty-four percent of the operators favored the change. A program was established to evaluate the effects on plant performance, operator alertness, attrition, sleep, health, job satisfaction, and off-the-job satisfaction. Preliminary results from that evaluation program indicate that the 12-hour shift schedule is a reasonable alternative to an 8-hour schedule at this facility.

47454 **(ITEF—107-1985) Method and computer code for three-dimensional calculation of a subcritical heterogeneous reactor with a source.** Malofeev, V.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703283.

General characteristics of the TRECGS program designed for three-dimensional calculation of a subcritical heterogeneous reactor or assembly with channels and sources (local or extended), located in hexagonal lattice points are presented. The difference transformation of heterogeneous theory equations in combination with decomposition of neutron flux axial constituent in the Fourier series by sines and a two-step iterative procedure to solve the system of algebraic equations are used. The typical calculating time of a subcritical assembly with 600 channels in four-group approximation with the accuracy in cannel-by-channel distribution of fluxes not worse than 10/sup -4/ constitutes about 10 min in case of 10 axial harmonics. 4 refs.

47455 **(ITEF—167-1986) MAKET zero power reactor.** Karavaev, G.N.; Kiselev, G.V.; Kukushkin, Yu.A.; Kopruk, A.P.; Medzhibovskij, B.A.; Popkov, V.N.; Ryazhskij, V.I.; Sal'nikov, A.A.; Shvedov, O.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 30p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703301.

The MAKET universal zero power reactor for investigation of neutron-physical and operational lattice parameters in heavy water reactors of different types and purposes is described. The reactor structural features permit to carry out a wide range of investigations from determination of the cell microparameters to full-scale models of research and power reactor cores. The reactor displays unique potentialities for investigating methods of nuclear safety in designed and operating heavy water reactors of different types and purposes. Since 1977, when the MAKET reactor was put into operation, extensive information on heavy water lattice parameters in HEUHWR and HWR-M reactors used for checking and correction of heterogeneous few-group computer programs, evaluating the scale of the effects connected with local heterogeneities of lattices as well as for nuclear safety studies for designed and operating heavy water reactors, was obtained. 6 refs.; 7 figs.

47456 **(ORNL/TM—10513) High Flux Isotope Reactor quarterly report, January through March 1987.** Corbett, B.L.; Farrar, M.B.; Shirley, E.M. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 16p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000031.

The end-of-cycle 287 shutdown was begun on November 14, 1986, and extended indefinitely to investigate the embrittlement of reactor vessel materials due to radiation damage. This shutdown was extended through the first quarter of 1987. Activities at the High Flux Isotope Reactor (HFIR) during the quarter have centered on maintenance, calibration, and modification of reactor systems. Analytical efforts continue to determine whether or not the HFIR can be operated safely with the present damaged vessel. Also, preliminary studies are being conducted to investigate the feasibility of annealing the damaged vessel or replacing it with a new vessel.

47457 **(ORNL/TM—10514) Bulk Shielding Facility quarterly report, April, May, and June 1987.** Hamrick, T.P.; Muggridge, F.E. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 19p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000032.

The Bulk Shielding Reactor (BSR) remained shutdown during April, May, and June. Water-quality control in both the reactor primary and secondary cooling systems was satisfactory. The PCA is shutdown for shim-safety rod magnets and associated electronic components upgrading.

47458 **(ORNL/TM—10517) Oak Ridge Research Reactor quarterly report, April, May, and June 1987.** Hamrick, T.P.; Ford, M.K. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 24p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000033.

The ORR was not operated during April, May, and June of 1987. The ORR remained down during the quarter as ordered by the Department of Energy. Maintenance activities, both mechanical and instrument, were essentially routine in nature.

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47459 **(N—87-23692) Nuclear powered Mars cargo transport mission utilizing advanced ion propulsion.** Galecki, D.L.; Patterson, M.J. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1987. 29p. (NASA-TM—100109; E—3641; NAS—1.15:100109; AIAA—87-1903; CONF-8706157—5). NTIS, PC A03/MF A01.

From 23. AIAA/SAE/ASME/ASEE joint propulsion conference; San Diego, CA, USA (29 Jun 1987).

Nuclear-powered ion propulsion technology was combined with detailed trajectory analysis to determine propulsion system and trajectory options for an unmanned cargo mission to Mars in support of manned Mars missions. A total of 96 mission scenarios were identified by combining two power levels, two propellants, four values of specific impulse per propellant, three starting altitudes, and two starting velocities. Sixty of these scenarios were selected for a detailed trajectory analysis; a complete propulsion system study was then conducted for 20 of these trajectories. Trip times ranged from 344 days for a xenon propulsion system operating at 300 kW total power and starting from lunar orbit with escape velocity, to 770 days for an argon propulsion system operating at 300 kW total power and starting from nuclear start orbit with circular velocity. Trip times for the 3 MW cases studied ranged from 356 to 413 days. Payload masses ranged from 5700 to 12,300 kg for the 300 kW power level, and from 72,200 to 81,500 kg for the 3 MW power level.

47460 **(N—87-24525) NASA/USAF arcjet research and technology program.** Stone, J.R.; Huston, E.S. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1987. 21p. (NASA-TM—100112; E—3656; NAS—1.15:100112; AIAA—87-1946; CONF-8706157—6). NTIS, PC A02/MF A01.

From 23. AIAA/SAE/ASME/ASEE joint propulsion conference; San Diego, CA, USA (29 Jun 1987).

Direct current arcjets have the potential to provide specific impulses greater than 500 sec with storable propellants, and greater than 1000 sec with hydrogen. This level of performance can provide significant benefits for such applications as orbit transfer, station keeping, orbit change, and maneuvering. The simplicity of the arcjet system and its elements of commonality with state-of-the-art resistojet systems offer a relatively low risk transition to these enhanced levels of performance for low power (0.5 to 1.5 kW) station keeping applications. Arcjets at power levels of 10 to 30 kW are potentially applicable to orbit transfer missions. Furthermore, with the anticipated development of space nuclear power systems, arcjets at greater than 100 kW may become attractive. This paper describes the ongoing NASA/USAF program and describes major recent accomplishments.

47461 **Nuclear reactor power for an electrically powered orbital transfer vehicle.** Jaffe, L.; Beatty, R.; Bhandari, P.; Chow, E.; Deininger, W.; Ewell, R.; Fujita, T.; Grossman, M.; Kia, T.; Nesmith, B. (California Institute of Technology, Pasadena). *AIAA Paper;* 7(May 1987). (AIAA-Paper—8-1102; CONF-870558—).

From 19. international electric propulsion conference; Colorado Springs, CO, USA (11 May 1987).

To help determine the systems requirements for a 300-kWe space nuclear reactor power system, a mission and spacecraft have been examined which utilize electric propulsion and this nuclear reactor power for multiple transfers of cargo between low earth orbit (LEO) and geosynchronous earth orbit (GEO). A propulsion system employing ion thrusters and xenon propellant was selected. Propellant and thrusters are replaced after each sortie to GEO. The mass of the Orbital Transfer Vehicle (OTV), empty and dry, is 11,000 kg; nominal propellant load is 5000 kg. The OTV operates between a circular orbit at 925 km altitude, 28.5 deg inclination, and GEO. Cargo is brought to the OTV by Shuttle and an Orbital Maneuvering Vehicle (OMV); the OTV then takes it to GEO. The OTV can also bring cargo back from GEO, for transfer by OMV to the Shuttle. OTV propellant is resupplied and the ion thrusters are replaced by the OMV before each trip to GEO. At the end of mission life, the OTV's electric propulsion is used to place it in a heliocentric orbit so that the reactor will not return to earth. The nominal cargo capability to GEO is 6000 kg with a transit time of 120 days; 1350 kg can be transferred in 90 days, and 14,300 kg in 240 days. These capabilities can be considerably increased by using separate Shuttle launches to bring up propellant and cargo, or by changing to mercury propellant.

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REFER ALSO TO CITATION(S) 47450, 47594, 48515

47462 **(CEA-CONF—8904) Qualification of class 1e equipment: regulation, technological margins and test experience.** Pasco, Y.; Le Meur, M.; Henry, J.Y.; Droger, J.P.; Morange, E.; Roubault, J.; Raimondo, E. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Oct 1986. 20p. (In French and English). (CEA-DAS—306; CONF-860908—44). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752600.

From Operability of nuclear power systems in normal and adverse environments meeting; Albuquerque, NM, USA (29 Sep 1986).

French regulation requires licensee to qualify electrical equipment important to safety for service in nuclear power plants to ensure that the equipment can perform its safety function under the set of plausible operating conditions. The French regulatory texts entitled fundamental safety rules have classified safety related electrical equipment in three main categories: k1, k2, k3, according to their location and operating conditions. The definition of a design basis accident test profile must account for margins applied to thermal hydraulic code outputs. Specific safety margins was added to cover uncertainties in qualification test representativity. Up to now, accidental sequence studies have shown the validity of such a qualification test profile. On the other hand, the results from post accident simulation tests have shown that it is useful not only to validate post accident operating life but also to reveal failures initiated during previous tests.

47463 **(CEA-CONF—8905) Motivation of parametric studies. French recommendations concerning surveillance in exploitation. Program of steam generator inspection.** Birac, C. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Oct 1986. 22p. (In French). (CEA-DAS—308; CONF-8610290—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752601.

From Symposium on programme for the inspection of steel components; Varese, Italy (13 Oct 1986).

The PISC/2 program deals with parametric studies; the different parameters that may have an influence on the defect detection and sizing are the following ones: effect of the defect characteristic and sitting, effect of the measuring system characteristics, and possible utilization of electro-magnetic techniques. A second part of this report concerns the French recommendations concerning surveillance while the power plant is operating. Finally the PISC 3 program is presented; it will deal with steam generator control: experimental evaluation of the performance of the tests applied to the nuclear power plant steam generator tubes.

47464 **(CEA-CONF—8906) Some important points of the French safety approach.** Queniart, D. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Oct 1986. 20p. (In French). (CEA-DAS—309; CONF-8610291—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752602.

From International meeting of nuclear reactor safety committees; Racine, PA, USA (20 Oct 1986).

The traditional deterministic approach has been completed with the development of the French electronuclear program mainly in two directions: the probabilistic approach and the approach of severe accidents.

47465 **(CEA-CONF—8908) Scenario of the accident of Chernobyl. Technical aspects and safety.** Dupuis, M.C. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Nov 1986. 24p. (In French). (CEA-DAS—312; CONF-861162—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752603.

From 14. ATSR symposium on radiation protection problems encountered in major developments in new techniques and technologies; Paris, France (26 Nov 1986).

After some indications on the Chernobylsk power plant and the characteristics of the RBMK series, the scenario of the accident is developed. The immediate consequences and the control of the accident are commented before concluding on more general lessons at the safety level.

47466 **(CONF-8709122—1) Review of new integral determinations of decay heat.** Dickens, J.K. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 12p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014412.

From Specialists' meeting on data for decay heat predictions; Studsvik, Sweden (7 Sep 1987).

Over a decade ago, concern over possible serious consequences of a loss-of-coolant accident in a commercial light-water reactor prompted support in several countries of several experiments designed specifically to measure the decay heat of beta-ray and gamma-ray emanations from fission products for thermal reactors. In 1979, a new standard for use in computing decay heat in real reactor environs (for example, for regulatory requirements) was approved by the American Nuclear Society. Since then there have been additional experimental measurements, in particular for fission-induced by fast neutrons. In addition, the need for decay-heat data has been extended well beyond the time regime of a loss-of-coolant accident. The efficacy of the 1979 ANS standard has been a subject of study with generally positive results. However, a specific problem, namely, the consequences for decay heat of fission-product neutron capture merits further experimental study.

47467 **(DOE/HWP—35) Technical and economic assessment for decommissioning the Air Force Nuclear Engineering Center, Wright-Patterson AFB, Ohio: Hazardous Waste Remedial Actions Program.** Gibson, S.M.; Carter, W.L. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 264p. (ORNL/M—395). NTIS, PC A12. File Number DE87014886.

Each of four options was screened for entombed nuclear reactor on the bases of technical feasibility, environmental impact, economics, and fulfillment of the goals of the Installation Restoration Plan. The four options for study were facility upgrade and surveillance program, removal of radioactive material inside the entombment and adjacent facilities, the latter plus removal of concrete monolithic structure, or raze all structures and restore site to allow unrestricted use. All options are technically feasible, but the handling of radioactive metal and concrete materials requires careful foreplanning. The first has the potential for the highest environmental impact because no radioactive materials will be removed. Some atomic species will not decay to acceptable levels, to allow unrestricted access for centuries. The environmental impacts for the remaining options are short term and focus on the decommissioning activities, primarily waste disposal, occupational exposure, and waste transportation. Economic assessment of the four options was based on past experience with similar decontamination and decommissioning projects. 52 refs., 20 figs., 29 tabs.

47468 **(EIR—623) Measured distribution of activation products, including tritium, in the biological shielding of the shutdown research reactor DIORIT.** Francioni, W.M.; Reidinger, F.; Goerlich, W. (Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland)). May 1987. 5p. (In German). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702886.

Annular core samples were taken from the biological shielding of the research reactor DIORIT, which is no longer in operation. In this report, details of the first core sample and of its measured activation profile are presented. The core sample was removed at a height close to the reactor centerline, roughly at the level of maximum neutron flux. The distribution of activation products in the thermal shielding (grey cast iron) and in the neighbouring colemanit concrete was analysed. In addition, the tritium distribution in the concrete was measured. Tritium had diffused as far as the neighbouring baryte concrete.

47469 **(EPRI-NP—5357) PWR [pressurized water reactor] pressurizer transient response: Final report.** Murphy, S.I. (Dartmouth Coll., Hanover, NH (USA). Thayer School of Engineering; Electric Power Research Inst., Palo Alto, CA (USA)). Aug 1987. 108p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920573.

To predict PWR pressurizer transients, Ahl proposed a three region model with a universal coefficient to represent condensation on the water surface. Specifically, this work checks the need for three regions and the modeling of the interfacial condensation coefficient. A computer model has been formulated using the basic mass and energy conservation laws. A two region vapor and liquid model was first used to predict transients run on a one-eleventh scale Freon pressurizer. These predictions verified the need for a second liquid region. As a result, a three region model was developed and used to predict full-scale pressurizer transients at TMI-2, Shippingport, and Stade. Full-scale pressurizer predictions verified the three region model and pointed out the shortcomings of Ahl's universal condensation coefficient. In addition, experiments were run using water at low pressure to study interface condensation. These experiments showed interface condensation to be significant only when spray flow is turned on; this result was incorporated in the final three region model.

47470 **(EPRI-NP—5419) EPRI Nondestructive Evaluation Center: 1986 annual report.** Stone, R.M.; Ammirato, F.V.; Pherigo, G.L.; Wilson, G.H. III.; Davis, J.M.; Jeong, Y.H.; Krzywosz, K.J.; MacDonald, D.E.; Nottingham, L.D.; Sasahara, T. (Jones (J.A.) Applied Research Co., Charlotte, NC (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 141p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920008.

This report describes the Electric Power Research Institute (EPRI) Nuclear Division funded nondestructive evaluation (NDE) project activities carried out at the EPRI NDE Center in 1986. The current objective is to operate a dedicated facility for providing improved and field-qualified NDE equipment, procedures, and personnel training to the electric utility industry. The major task of the NDE Center is transfer of research and development results funded by EPRI and other related projects to useful field application. This is being accomplished by qualification and refinement of equipment and techniques, training under realistic conditions, and encouragement of greater involvement of the academic community in NDE education. Significant assistance has been provided to the nuclear utility industry under this project in the form of improved, field-ready equipment and procedures; critically needed assessments of inspection method capability; demonstrations of effectiveness of examination methods; rapid response for critical, short-term problems; and training for specific utility industry needs. These efforts have specifically addressed steam generator, piping, steam turbine, and heavy section inspection problems.

47471 **(GRS-S—40) Recent findings about the Chernobyl reactor accident. Pt. 1 and 2. Pt. 1: Summary and evaluation of information provided on the plant and the course of the accident. Pt. 2: Radiological repercussions in the Federal Republic of Germany and other European countries. As of October 1986.** (Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)). Nov 1986. 74p. (In German). Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln, Germany, F.R.

The brochure gives a report of the accident at Chernobyl. It deals with the plant design and causes and effects of the accident and makes an assessment relative to Federal German plants. In particular, it discusses the actual course of the event, measures taken at the plant level, and conclusions at the international level. As yet, no assessment, analysis, and critical evaluation of the radiological effects can be made; also, they are described for the Federal Republic of Germany and the other European countries on the basis of the transport of activity in the atmosphere and environmental contamination, the preventive measures taken to minimize the radiation exposure of the population, and the radiation to which the population was exposed.

47472 **(HEDL-SA—3454-FP) Evaluation of the confinement option for LMRs.** Himes, D.A.; Stepnewski, D.D.; Franz, G.R. (Hanford Engineering Development Lab., Richland, WA (USA)). Dec 1985. Contract AC06-76FF02170. 21p. (CONF-860652—33). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014373.

From 7. topical meeting on the technology of fusion energy; Reno, NV, USA (15 Jun 1986).

The coolant in liquid metal cooled reactors operates at low pressures and therefore contains relatively little stored energy compared to LWR systems. This presents the possibility of using a more conventional building for containment coupled with a confinement system which vents the internal volume of the building through a filter/scrubber. The confinement system would be designed to keep the internal pressure in the containment near atmospheric thereby minimizing unfiltered leakage. The principal benefits of such an arrangement would be lower capital cost and less stringent leaktightness requirements permitting simpler and less disruptive testing. In conclusion, the confinement system assumed here would reduce consequences to the public of an LMR HCDA to acceptable levels. However control room doses are unacceptable due to the noble gas concentration inside the control room. A confinement system is therefore a viable design option for LMR's provided means are included for keeping noble gases out of the control room. Such means are readily available including, for example, selectable remote air intakes, an exhaust stack, or a noble gas filter. Probably the most satisfactory alternative would be a large cryogenic filter on the confinement system exhaust.

47473 **(INIS-mf—10685) Investigation of the design and thermal behaviour of a core catching device for a light water reactor.** Gruia, D.C. (Essen Univ. (Gesamthochschule) (Germany, F.R.). Fachbereich Energie-, Verfahrens- und Elektrotechnik). 1984. 152p. (In German). NTIS (US Sales Only), PC A08/MF A01. File Number DE87752784.

A new type of core catching device is described. Realistic complex investigations (thermodynamics, nuclear calculations) should make it possible to assess the feasibility of such an additional safety device. It is installed beneath the reactor pressure vessel. Graphite, UO/sub 2/ and ThO/sub 2/ are proposed as materials, which can accommodate the melt safely and also pass the heat on to the cooling system.

47474 **(INIS-mf—10696) Chernobyl reactor accident and its consequences. 3. Rev. Ed .** (Hessisches Sozialministerium, Wiesbaden (Germany, F.R.)). 1987. 110p. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87752778.

The report presents a comprehensive survey of measured data explaining the radiation exposure in the Land Hessen, and a chronological survey of the decisions and measures taken by the Hessian regional government in response to the Chernobyl reactor accident. The measures for instance included selection of appropriate measuring methods and sites, checking of various environmental material, waste disposal surveillance, and dose assessments, and a range of monitoring programmes.

47475 (INIS-mf—10706, pp 1-11) **Comparison of national safety concepts for nuclear power plants.** Franzen, F.L. (International Atomic Energy Agency, Vienna, Austria). 1986. (In German). NTIS (US Sales Only), PC A16/MF A01. File Number DE87752788. (CONF-8605275—).

From VGB special meeting on Yugoslavia; Bled, Yugoslavia (14 May 1986).

The author deals with concepts aiming at securing sufficient safety for the personnel and the general public in the operation of nuclear power plants. Nuclear-specific safety philosophies are presented. Safety concepts are compared and discussed, design and safety goals and safety criteria are defined. Future prospects are described by means of various exemplifying safety facilities. (HAG).

47476 **(INIS-XN—61) Decommissioning of nuclear facilities. Feasibility, needs and costs.** (Nuclear Energy Agency, 75 - Paris (France)). 1986. 85p. NTIS (US Sales Only), PC A05/MF A01. File Number DE87702910.

Also published in French.

Reactor decommissioning activities generally are considered to begin after operations have ceased and the fuel has been removed from the reactor, although in some countries the activities may be started while the fuel is still at the reactor site. The three principal alternatives for decommissioning are described. The factors to be considered in selecting the decommissioning strategy, i.e. a stage or a combination of stages that comprise the total decommissioning programme, are reviewed. One presents a discussion of the feasibility of decommissioning techniques available for use on the larger reactors and fuel cycle facilities. The numbers and types of facilities to be decommissioned and the resultant waste volumes generated for disposal will then be projected. Finally, the costs of decommissioning these facilities, the effect of these costs on electricity generating costs, and alternative methods of financing decommissioning are discussed. The discussion of decommissioning draws on various countries' studies and experience in this area. Specific details about current activities and policies in NEA Member Countries are given in the short country specific Annexes. The nuclear facilities that are addressed in this study include reactors, fuel fabrication facilities, reprocessing facilities, associated radioactive waste storage facilities, enrichment facilities and other directly related fuel cycle support facilities. The present study focuses on the technical feasibility, needs, and costs of decommissioning the larger commercial facilities in the OECD member countries that are coming into service up to the year 2000. It is intended to inform the public and to assist in planning for the decommissioning of these facilities.

47477 **(NEI-DK—30) Chernobyl accident and Denmark.** (Miljoestyrelsen, Copenhagen (Denmark). Atomberedskabet). Dec 1986. 83p. (In Danish). NTIS (US Sales Only), PC A05/MF A01. File Number DE87752504.

The report describes the Chernobyl accident and its consequences for Denmark in particular. It was commissioned by the Secretary of State for the Environment. The event at the accident site, the release and dispersal of radioactive substances into the atmosphere and over Europe, is described. A discussion of the Danish organisation for nuclear emergencies, how it was activated and adapted to the actual situation, is given. A comprehensive description of the radiological contamination in Denmark following the accident and the estimated health effects, is presented. The situation in other European countries is mentioned.

47478 **(NEI-DK—31) Chernobyl accident and Denmark. Appendices. Vol. 1.** (Miljoestyrelsen, Copenhagen (Denmark). Atomberedskabet). Dec 1986. 255p. (In Danish). NTIS (US Sales Only), PC A12/MF A01. File Number DE87752506.

The report describes the Chernobyl accident and its consequences for Denmark in particular. It was commissioned by the Secretary of State for the Environment. Volume 1 contains copies of original documents issued by Danish authorities during the first accident phase and afterwards. Evaluations, monitoring data, press releases, legislation acts etc. are included.

47479 **(NEI-DK—32) Chernobyl accident and Denmark. Appendices. Vol. 2.** (Miljoestyrelsen, Copenhagen (Denmark). Atomberedskabet). Dec 1986. 255p. (In Danish). NTIS (US Sales Only), PC A12/MF A01. File Number DE87752505.

The report describes the Chernobyl accident and its consequences for Denmark in particular. It was commissioned by the Secretary of State for the Environment. Volume 2 contains copies of original documents issued by Danish authorities during the first accident phase and afterwards. Evaluations, monitoring data, press releases, legislation acts etc. are included.

47480 **(NEI-NO—23) Radioactive fallout over Norway after the reactor accident in USSR. Radioactivity in foodstuffs 1986.** (Helsedirektoratet, Oslo (Norway)). Dec 1986. 30p. (In Norwegian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87752528.

This report contains continued measurements of the environmental impact in Norway of the Chernobyl accident. Based on measurements in the period June - November, 1986 the report sys-

tematizes and presents the status quo regarding the radioactivity in meat, dairy produce, fish and vegetables. Radiation exposure to man is also discussed. For a period of one year from the accident, a collective-dose to the Norwegian population of 1100-1600 manSv has been estimated. Fallout from Chernobyl may cause 30-50 cases of cancer in Norway during the next 50 years.

47481 (NGU/R—86.160) **Determination of radioactive fallout after the Chernobyl accident.** Lindahl, I.; Haabrekke, H. (Norges Geologiske Undersoekelse, Oslo). Sep 1986. 26p. (In Norwegian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87752529.

After the Chernobyl accident, a coarse-meshed all-over picture of the radioactive ground deposition on Norway's land area was obtained by radiometric scanning from car. The measurements were carried out by the Geological Survey of Norway in the period 5 May - 6 June, 1986. High-concentration areas in the central part of the country were in addition surveyed by aerial scanning. By combining the scanning results with in situ background measurements, it was possible to calculate the distribution of some dominant radionuclides on the ground. The measured data are presented on contamination maps.

47482 (NGU/R—86.161) **NGU's follow-up after the Chernobyl accident and their utilitarian value in future preparedness.** Hoest, J. (Norges Geologiske Undersoekelse, Oslo). Sep 1986. 30p. (In Norwegian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87752530.

The report describes how the Geological Survey of Norway (NGU) organized and made public its fallout survey after the Chernobyl accident. NGU's view on their future share in Norwegian radiation protection preparedness and monitoring is expressed.

47483 (NUREG/CP—0078) **Proceedings of the symposium on chemical phenomena associated with radioactivity releases during severe nuclear plant accidents.** Niemczyk, S.J. (ed.). (Gull Associates, Washington, DC (USA); Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). Jun 1987. 707p. (CONF-860911—Pt.1). NTIS, PC A99/MF A01 - GPO. File Number DE87900833.

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

The Symposium on Chemical Phenomena Associated with Radioactivity Releases During Severe Nuclear Plant Accidents was held during the American Chemical Society National Meeting in Anaheim, California, September 9-12, 1986. The purpose of the symposium was to provide a forum for discussion of chemical processes and phenomena potentially occurring during severe nuclear plant accidents. The symposium included an overview session designed to help place chemical issues in context in a severe accident perspective, as well as six sessions devoted to a variety of severe accident chemistry topics. Those topics included releases of radioactive and nonradioactive species from core materials in the reactor vessel; transport and behavior of those species in the reactor coolant system; transport and behavior of released species within the containment; releases during core-concrete interactions, as well as other aspects of such interactions; effects of engineered safety features and other plant systems; effects of extreme in-plant environments (such as high radiation fields and combustion zones); and potentially disruptive phenomena (such as high-pressure ejection of the melt from the reactor vessel). The proceedings represent the compilation of all the papers presented at the symposium. Each paper (excluding the leading remarks and the panel discussion) have been cataloged separately.

47484 (NUREG/CP—0078, pp 1.7-1.20) **Severe accident behavior.** Denning, R.S. (Battelle Columbus Div., OH). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

The purpose of this paper is to provide an overview of severe accident behavior. The term "source term" is defined and a brief history of the regulatory use of source terms is presented. The processes in severe accidents in light water reactors are described with particular emphasis on the relationships between accident thermal-hydrualics and chemistry. Those factors which have the greatest impact on predicted source terms are identified. Design differences between plants that affect source term estimation are also described. The principal unresolved issues are identified that are the focus of ongoing research and debate in the technical community.

47485 (NUREG/CP—0078, pp 1.41-1.59) **Ex-plant consequence analysis: models, typical results, uncertainties, chemistry.** Sprung, J.L. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

Estimation of ex-plant consequences is the customary final step in a probabilistic assessment of the risks of severe nuclear reactor accidents. The elements of an ex-plant consequence analysis are described, typical results presented, and controlling phenomena, uncertainties, and the importance of chemical form identified.

47486 (NUREG/CP—0078, pp 2.1-2.18) **The chemistry of nuclear reactor accidents: problems and progress.** Parker, G.W. (Oak Ridge National Lab., TN). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Any evaluation of the chemical effects to be expected in severe reactor accidents involving primarily the high-temperature interaction of core and coolant must account for the extremes of both oxidation and reduction reactions, since they can lead to widely diverse phenomena. Any definitive study of core-melt chemistry must also recognize the powerful environmental effects imposed by the characteristic thermal-hydraulics of each class of hypothetical accidents, including that demonstrated by Three Mile Island-Unit 2 (TMI-2). Research in this area has identified significant new effects of materials interactions, time-dependent temperature gradients, and size-related geometric factors. Especially sensitive to these effects are the reactor control materials (boron and silver) and the fission products tellurium, strontium, barium, and molybdenum. The releases measured in these experiments were less than those predicted by the radiological source-term reassessment, which is often quoted as being less conservative and more realistic than the source-term estimates of 1974.

47487 (NUREG/CP—0078, pp 2.19) **Role of chemistry in nuclear accidents.** Johnson, C.E.; Johnson, I. (Argonne National Lab., IL). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

47488 (NUREG/CP—0078, pp 2.21-2.34) **Real time mass spectrometric evaluation of fission product transport at temperature and pressure.** Alexander, C.A.; Ogden, J.S. (Battelle Columbus Div., OH). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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A modulated molecular beam inlet operable at temperatures up to 2400K and pressures up to 30 bar was coupled with a mass spectrometer for study of fuel segments that had undergone burnup to as much as 40,000 MWD/T. Studies indicate that at the low gas-phase concentrations near the fuel surface, kinetics and free energy factors favor release as the elemental form or as a simple oxide. Also, the $T\Delta S$ contribution to the free energy dominates at temperatures above 2000K, so that formation of hydrated species is severely inhibited even at high gas pressures. There are two competitive mechanisms for the release of the semi-volatile fission products and actinides. The first involves solid-state diffusion to the surface with subsequent volatilization. The second, which is dominant at high temperatures, is stripping of the surface by volatilization of the urania matrix. Kinetic factors were determined so that the relative importance of both mechanisms can be assessed for any postulated accident scenario.

47489 (NUREG/CP—0078, pp 2.35-2.49) **Oxidation of UO_2 in air and steam with relevance to fission product releases.** Cox, D.S.; Hunt, C.E.L.; Keller, N.A.; Iglesias, F.C.; Barrand, R.D.; Mitchell, J.R.; O'Connor, R.F. (Chalk River Nuclear Labs., Ontario). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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This study of UO_2 oxidation is part of a program in support of the modelling of fission product release during postulated accidents in CANDU reactors. Some experiments were performed in steam at 1000 to 1650°C while others were conducted in air at 500 to 1200°C. Oxidation in steam above 1100°C produced hyperstoichiometric UO_2 and an analysis of the kinetics indicated that the rate-controlling process was reaction at the steam/oxide interface. Also significant volatilization of UO/sub 2+X/ was measured and mass transport rates were substantially lower than theoretically calculated rates assuming UO_3 or $UO_2(OH)_2$ as the evaporating species. Oxidation of UO_2 in air at 500°C proceeded by grain boundary attack, producing sub-grain sized fragments of U_3O_8. Air oxidation at 900 to 1200°C produced large columnar grains of U_3O_8 and the kinetics showed that pre-breakaway oxidation was controlled by solid state diffusion of oxygen.

47490 (NUREG/CP—0078, pp 2.51-2.63) **The release and transport of fission products during oxidation of UO_2 in air.** Hunt, C.E.L.; Iglesias, F.C.; Cox, D.S.; Keller, N.A.; Barrand, R.D.; Mitchell, J.R.; O'Connor, R.F. (Chalk River Nuclear Labs., Ontario). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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We have been investigating the role of oxidation of UO_2 on the release of fission products as part of a general program on the consequences of postulated accidents in CANDU reactors. Generally, specimens of UO_2 were heated to the test temperature in flowing argon. Air was introduced in place of the argon and gaseous fission products were measured continuously with a gamma-ray spectrometer located downstream. In a few tests, the temperature was ramped a second time to a higher temperature while maintaining the air flow. Less volatile fission products were deposited in the thermal gradient of the furnace tube. Both freshly irradiated fuel and fuel which had been stored for about two years after discharge from the reactor were tested at temperatures from 400° to 1600°C. Cs, I, Te, Ru, Ce, Zr, Nb, Ba and La fission products were identified. Analysis showed that large quantities of ruthenium were released from UO_2 above 800°C and that the release depended strongly on the degree of UO_2 oxidation. Measurable release of tellurium occurred at 1100°C. Under the conditions of these experiments - oxidation of the UO_2 by flowing air - cesium and iodine were deposited independently. Observations on the behavior of other chemical species are presented.

47491 (NUREG/CP—0078, pp 2.65-2.78) **Chemical characteristics of material released during source term experiments project (STEP) in-pile tests: Part I.** Schlenger, B.J.; Dunn, P.F.; Herceg, J.E.; Simms, R.; Horton, E.L.; Baker, L. Jr.; Ritzman, R.L. (Argonne National Lab., IL; Electric Power Research Institute, Palo Alto, CA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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A series of four experiments aimed at characterizing the radiological source term associated with postulated severe light water reactor (LWR) accidents has been conducted at Argonne's Transient Reactor Test Facility (TREAT). The STEP tests drove fuel elements to the point of severe cladding disruption in steam environments by fission heating and oxidation of the Zircaloy cladding. The released fission products and volatile cladding constituents entrained in the steam/hydrogen flows were captured by the test vehicles' sampling systems and analyzed by SEM/EDX. The principal constituents of the deposits were fission product cesium, molybdenum and rubidium, and tin from the cladding. Iodine was predominantly seen collocated with cesium. Structural material was also observed. The composition information in conjunction with counted particle distributions were used to determine the particle loading of that portion of the material released during the first test that was transported in aerosol form.

47492 (NUREG/CP—0078, pp 2.79-2.86) **Chemical characteristics of material released during source term experiments project (STEP) in-pile tests: Part II.** Fink, J.K.; Roche, M.F.; Seils, C.A.; Steidl, D.V.; Johnson, C.E.; Ritzman, R.L. (Argonne National Lab., IL; Electric Power Research Institute, Palo Alto, CA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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This is the second of two papers on the results of experiments conducted at the Transient Reactor Test Facility to characterize the source term associated with hypothetical accident sequences at light water reactors. The first paper describes the in-pile experiments and presents the scanning electron microscopy, energy-dispersive X-ray, and aerosol studies on materials that were released from the fuel rods. This paper focuses on the chemistry of the materials released in one of the tests, STEP-1, which was designed to simulate a large coolant-pipe break with failure of emergency core cooling, rapid depressurization, and prompt core uncovery (AD sequence). The predominant aerosol constituents released in STEP-1 were tin, molybdenum, and cesium with significant amounts of rubidium also found.

47493 (NUREG/CP—0078, pp 3.1-3.17) **Reactor coolant system and containment aqueous chemistry.** Torgerson, D.F.; Vikis, A.C.; Wren, D.J. (Whiteshell Nuclear Research Establishment, Pinawa, Manitoba). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Current research and issues relating to fission product transport in reactor coolant systems and containment are described. Experimental and analytical work has been done to elucidate radiation effects, gas phase chemistry, and surface reactions under conditions characteristic of post-accident reactor coolant systems. Research on containment chemistry is focussing on the production of volatile iodine species in aqueous solutions, and on the transport of these species to the gas phase. The latter research involves the effects of impurities and radiation on iodine speciation, and the production of organic iodides. A computer code, LIRIC, has been developed to describe the long-term release of iodine from aqueous solutions.

47494 (NUREG/CP—0078, pp 3.19-3.36) **Importance of environment on high temperature reactor accident chemistry.** Elrick, R.M.; Sallach, R.A. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The Fission Product Reaction Facility used in the High Temperature Fission Product Chemistry Program at Sandia is described. Results of studies using cesium hydroxide and cesium iodide in this facility to simulate the behavior of these fission product species in severe reactor accident environments are described. A model is developed for the observed reaction of CsOH with the oxide formed on stainless steel. Recent observations on the stability of CsI in the presence and absence of an ionizing radiation field are discussed. Surface reaction rate constants for these species in accident environments are presented.

47495 (NUREG/CP—0078, pp 3.37-3.52) **Integrated analysis of fission product transport in reactor coolant systems.** Sehgal, B.R.; Ritzman, R. (Electric Power Research Institute, Palo Alto, CA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Fission product transport and retention in the coolant systems of PWR's and BWR's cannot be considered independently of the prevailing thermal hydraulic conditions. Recent modeling work

has attempted to couple these phenomena together and this paper describes the progress made to date by various investigators. An integrated analysis must address a number of technical issues such as the magnitude and rate of release of fission products and structural components from core materials during heatup and melting, the effect of recirculation flows on fission product deposition in the reactor coolant system, and the formation, growth, and deposition of aerosols within the system. In addition, the chemical reaction rates of fission products with each other and with bulk materials must be considered, and the timing and rate of revaporization of fission product deposits from reactor coolant system surfaces requires a coupled treatment. Results of analyses in which these various processes are simultaneously considered will be presented and discussed.

47496 (NUREG/CP—0078, pp 3.53-3.65) **Downstream behavior of fission products.** Johnson, I.; Farahat, M.K.; Settle, J.L.; Johnson, C.E.; Ritzman, R. (Argonne National Lab., IL; Electric Power Research Inst., Palo Alto, CA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The downstream behavior of fission products has been investigated by injecting mixtures of CsOH, CsI, and Te into a flowing steam/hydrogen stream and determining the physical and chemical changes that took place as the gaseous mixture flowed down a reaction duct on which a temperature gradient (1000° to 2000°C) had been imposed. Deposition on the wall of the duct occurred by vapor condensation in the higher temperature regions and by aerosol deposition in the remainder of the duct. Reactions in the gas stream between CsOH and CsI and between CsOH and Te had an effect on the vapor condensation. The aerosol was characterized by the use of impingement tabs placed in the gas stream.

47497 (NUREG/CP—0078, pp 3.67-3.78) **Influence of chemical form on cesium revaporization from the reactor coolant system.** Powers, D.A.; Bieniarz, P.P. (Sandia National Labs., Albuquerque, NM; Risk Management Associates, Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The issue of revaporization of deposited radionuclides during severe reactor accidents is discussed. Thermodynamic properties are estimated for the mixtures CsOH + CsI, $CsBO_2$ + B_2O_3, and Cs_2SiO_3 + SiO_2. It is shown that the chemical form of deposited cesium can alter the rate and timing of revaporization.

47498 (NUREG/CP—0078, pp 3.79-3.92) **Corrosion and deposition studies of stainless steel exposed to aerosols containing Te, Cs, I, Sn, Mn, Ag and B_2O_3 at 300 to 1000°C in a reducing ($H_2/H_2O/N_2$) environment.** Kazikowski, S.; Johansson, L.G.; Malmestroem, U.; Lindqvist, O. (Chalmers Univ. of Technology, Goeteborg, Sweden). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Preoxidized stainless steel samples (18% Cr, 9% Ni, 0.05% C) were exposed in a dynamic reducing atmosphere (5% H_2 + 3% H_2O in N_2) in the temperature range 300 to 1000°C. Various chemical substances, thought to be relevant to and representative of BWR/PWR core-melt or severe core heat-up conditions were vaporized by gradually heating them to a maximum temperature of 1700°C in the vicinity of the samples. The resulting corrosion of and deposition on the steel samples was studied by SEM/EDAX and XRD techniques. In addition the aerosol was sampled and analyzed. Rapid corrosion occurred, for example, at high temperatures when Sn and B_2O_3 were both present. In this case a tin-enriched zone was found on the metal beneath the solidified borate melt. Tellurium penetrated the oxide layer only when the metal temperature was high. Sometimes it was associated with Ni and in some cases with Fe. In other cases no enrichment of other elements was measured in the Te rich areas in the metal. Cs was found in the oxide layer at higher temperatures. Magnetite, iron borate, tin and silver metal were identified in the corrosion/deposition layer. In the aerosol collected at room temperature, CsI, CsOH, Ag, Te and $Cs_2B_{10}O_{16}$. $8H_2O$ were found.

47499 (NUREG/CP—0078, pp 3.93-3.105) **Chemical forms of fission product tellurium in a severe reactor accident.** Bowsher, B.R.; Dickinson, S.; Nichols, A.L.; Gomme, R.A.; Ogden, J.S.; Young, N.A. (UKAEA Atomic Energy Establishment, Winfrith; Univ. of Southampton, England). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The complex behaviour of the fission product elements released and transported from the core of a damaged pressurised water reactor (PWR) is exemplified by the behaviour of tellurium. Tellurium has been assumed to be evolved from overheated fuel in the elemental form (Te, Te_2), and these species will react with structural materials such as Zircaloy, Inconel-600 and 304 stainless steel. However, recent studies have demonstrated that tellurium transport in the primary circuit may be more complex. Tellurium may be evolved as elemental tellurium (Te, Te_2), tellurium monoxide and dioxide (TeO, (TeO_2), caesium tellurides (CsTe, Cs_2Te) and hydrogen telluride (H_2Te), the proportions of which will depend on the conditions in the core. Tellurium retention by Zircaloy cladding is only effective when the cladding is unoxidised; under steam-oxidising conditions, the tellurium will either not react or be released as stannous telluride (SnTe). Furthermore, any metal tellurides formed in the primary circuit may react with steam at high temperatures to form hydrogen telluride (H_2Te). Whilst Te_2 is the dominant vapour species above heated mixtures of Te-UO_2, TeO_2 vapour can be produced in oxidising conditions, and caesium tellurite (Cs_2TeO_3) has been detected as a stable vapour species above heated mixtures of caesium hydroxide (CsOH) and TeO_2, and tellurium and caesium uranate (Cs_2UO_4). Recent experimental studies of relevance to tellurium chemistry in severe reactor accidents are described, and specific recommendations are made with respect to nuclear safety analyses.

47500 (NUREG/CP—0078, pp 3.107-3.118) **Thermodynamic behaviour of fission products at high temperatures: ruthenium and tellurium.** Garisto, F. (Whiteshell Nuclear Research Establishment, Pinawa, Manitoba). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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During reactor loss-of-coolant-accidents, fission products can be released into the primary heat transport system (PHTS). The subsequent transport of the fission products into, and possibly out of, the containment building depends on the chemical and physical properties of the fission product compounds that are formed in the PHTS. Under certain conditions, chemical equilibrium calculations can be used to identify the predominant fission product chemical species formed in the high-temperature environment of the PHTS. In this paper, chemical equilibrium calculations are used to determine the ruthenium and tellurium chemical speciations in the PHTS for various conditions of temperature, oxygen partial pressure and fission product concentrations.

47501 (NUREG/CP—0078, pp 4.1-4.20) **Insights on severe accident chemistry from TMI-2.** Hobbins, R.R.; Cronenberg, A.W.; Langer, S.; Owen, D.E.; Akers, D.W. (EG & G Idaho, Inc., Idaho Falls; ESA, Inc., Idaho Falls, ID). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Chemical analyses are being carried out on materials removed from the damaged reactor at TMI-2. Characteristics of TMI-2 fuel, control, fission product and structural materials based on these analyses are presented. Emphasis is placed on chemistry within the pressure vessel although descriptions of, and postulated mechanisms for, materials transported from the vessel to the reactor building are also discussed. Indications of the oxygen potential in the reactor pressure vessel during the high temperature phase of the accident are of particular significance for the analysis of

damage progression and fission product behavior during severe accidents. The results of thermodynamic and kinetic calculations for chemical species present during the high temperature portion of the accident (during core uncovery) are presented. Insights on chemistry of significance for severe accident analysis which follow from the evaluation of the TMI-2 accident are discussed.

47502 (NUREG/CP—0078, pp 4.21-4.35) **Fission product behavior in the TMI-2 core: preliminary evaluation of transport and chemistry.** Akers, D.W.; Hobbins, R.R.; Langer, S.; Adams, J.P. (EG & G Idaho, Inc., Idaho Falls). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Within the past several years, samples of debris have been obtained from the plenum region, the upper debris bed and the lower reactor head of the damaged TMI-2 reactor. Results of these examinations are compared with fission product behavior under severe fuel damage conditions similar to TMI-2 as determined from integral and separate effects tests. Chemical mechanisms that could produce the observed fission product behavior are evaluated in light of the current understanding from experiment and theory. The principal radionuclides discussed are the isotopes of cesium and iodine. Evaluations of the behavior of less volatile fission products (i.e., ruthenium, antimony, and strontium) are also presented. Measured ^{137}Cs and ^{129}I retentions in the debris are higher than expected whereas ^{125}Sb and ^{106}Ru retentions are lower than expected based on estimated core temperatures.

47503 (NUREG/CP—0078, pp 4.37-4.51) **Post-accident TMI-2 decontamination and defueling.** Hofstetter, K.J.; Baston, V.F. (GPU Nuclear Corp., Middletown, PA; Physical Science Inc., Sun Valley, ID). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Following the accident at Three Mile Island-Unit 2 (TMI-2), a substantial quantity of fission products was distributed throughout various plant systems and areas. The control of further migration of these radionuclides was accomplished by various physical and chemical means. The decontamination and defueling activities have proceeded within specific regulatory, administrative, and hardware restrictions. A summary of the post-accident status of the plant systems and the decontamination methods used is discussed. The hardware installed and utilized to perform the cleanup operations is described and the methods and progress of defueling is also presented. The development of detailed water chemistry requirements and their effects on systems and decontamination efforts are discussed. The planning, scheduling, and performance of specific recovery tasks are presented along with a general overview of water and chemical management at TMI-2.

47504 (NUREG/CP—0078, pp 4.53-4.68) **TMI-2 reactor coolant system radionuclide accumulation rates.** Baston, V.F.; Hofstetter, K.J. (Physical Sciences, Inc., Sun Valley, ID; GPU Nuclear Corp., Middletown, PA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Chemical and radiochemical laboratory analyses have been performed on numerous contaminated water sources at Three Mile Island Unit-2 (TMI-2) on a periodic basis as part of the clean up activities. The general radionuclide concentrations in the reactor coolant system (RCS) since the accident (28 March 1979) has been decreasing as a function of both decay and plant operations (i.e., fluid leakage/make up and processing). Accumulation rates (appearance rate minus decay rate) are used to track radionuclide behavior as a function of time. Interpreting these rate data involves establishing the differences in the accumulation rates' chemical dependence for the various radionuclides (i.e., Cs-137 tend to follow congruent dissolution, Sb-125 appears dependent on the solution oxygen chemical potential, Sr-90 reflects a solubility dependence). The accumulation rate of radionuclides have been utilized in following RCS chemistry trends and provides a means of assessing the source term for defueling operations.

47505 (NUREG/CP—0078, pp 4.69-4.83) **The release and transport of fission product cesium in the TMI-2 accident.** Lorenz, R.A.; Collins, J.L. (Oak Ridge National Lab., TN). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Approximately 50% of the fission product cesium was released from the overheated UO_2 fuel in the TMI-2 accident. Steam that boiled away from a water pool in the bottom of the reactor vessel transported the released fission products throughout the reactor coolant system (RCS). Some fission products passed directly through a leaking valve with steam and water into the containment structure, but most deposited on dry surfaces inside of the RCS before being dissolved or resuspended when the RCS was refilled with water. A cesium transport model was developed that extended measured cesium in the RCS back to the first day of the accident. The model revealed that ~62% of the released ^{137}Cs deposited on dry surfaces inside of the RCS before being slowly leached and transported out of the RCS in leaked or letdown water. The leach rates from the model agreed reasonably well with those measured in the laboratory. The chemical behavior of cesium in the TMI-2 accident agreed with that observed in fission product release tests at Oak Ridge National Laboratory (ORNL).

47506 (NUREG/CP—0078, pp 4.85-4.98) **Analysis of fission product transport behavior during severe fuel damage experiments.** Osetek, D.J.; Sherry, R.R. (Idaho National Engineering Lab., Idaho Falls; JAYCOR, San Diego, CA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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This paper summarizes the analytical interpretation of the physicochemical behavior of fission products released, transported and deposited during Severe Fuel Damage (SFD) experiments conducted in the Power Burst Reactor Facility (PBF) and compares the calculation with measured behavior. The SFD experiments are designed to simulate the degraded thermal hydraulic environment of a nuclear reactor core and study fission product release and transport behavior at high temperature (>2400 K) accident conditions. The test measurements and analyses for the last two tests with previously irradiated fuel suggest that cesium is being transported predominantly as CsOH and iodine as CsI. The test results indicate that little, if any, iodine was transported in a more volatile chemical form such as molecular iodine. The observed transport behavior of other radionuclide species (except noble gases) indicate that they nucleated to form aerosols in the region between the fuel bundle and the upper plenum.

47507 (NUREG/CP—0078, pp 4.99-4.112) **Fission product behavior during the in-pile Severe Fuel Damage Test SFD 1-3.** Vinjamuri, K.; Osetek, D.J.; Meikrantz, D.H.; Baker, J.D. (EG & G Idaho Inc., Idaho Falls). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The Severe Fuel Damage (SFD) Test, SFD 1-3, was conducted in the Power Burst Facility at the Idaho National Engineering Laboratory (INEL) using a test assembly of 28 PWR-type fuel rods. Operational conditions of the test consisted of boil-down and dry-out of the top 80% of the 1-m fuel bundle, followed by controlled heat-up simulating an LWR heat-up by decay heat following loss of coolant. The peak transient temperatures reached were >2400 K. The entire effluent from the fuel bundle was routed through a heated and insulated line to a sampling and monitoring system. Several samples of the effluent were collected and analyzed using a variety of analytical techniques. Results are presented in terms of release fractions, release rates and the distribution of fission products in the sampling system. The probable chemical forms of the predominant fission product species are presented; and the release, transport and deposition of fission products are discussed.

47508 (NUREG/CP—0078, pp 4.113-4.125) **Fission product deposition behavior.** Baker, J.D.; Meikrantz, D.H.; Simpson, O.D. (EG & G Idaho, Inc., Idaho Falls). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The chemical behavior of fission products generated and released during Severe Fuel Damage transients is an important aspect of reactor safety research. However, the direct identification, study, and analysis of these samples for individual chemical characteristics is difficult. The samples are highly radioactive which requires special handling and modification of classical analytical techniques. Also, the species of interest are often trace quantities as compared to the environmental materials with which they are mixed. As a result, the deposition and leaching behavior of certain radioisotopes has been studied to provide insight toward likely chemical species formed and their respective transport behavior. This paper will discuss deposition behavior of ^{131}I, ^{137}Cs, /sup 127m/Te, ^{140}Ba and ^{90}Sr during the SFD 1-3 and SFD 1-4 tests conducted in the Power Burst Facility at the Idaho National Engineering Laboratory (INEL).

47509 (NUREG/CP—0078, pp 5.1-5.9) **Modeling the chemical behavior of radionuclides in severe nuclear accidents.** Gieseke, J.A.; Alexander, C.A. (Battelle Columbus Div., OH). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The chemical behavior of radionuclides can affect their eventual release to the environment during transport under accident conditions. Four areas or processes of importance are: release from the fuel and core region, reactions with gaseous environments and surfaces in the RCS, core-concrete interactions, and reactions with gases, surfaces and liquids in the containment. In the fuel itself, for example, the chemical potential of oxygen determines which complexes such as Cs_2UO_4 may be formed in the solid state. Interactions between fission products and various gases, vapors, or surfaces (including deposits) may affect whether significant retention occurs in the RCS. For cases where molten components of the core may fall through to interact with the concrete cavity floor, the chemical composition of the melt and concrete and their chemical interactions are predicted to determine, to a large extent, the rates at which fission products are evolved. Finally, in the containment building atmosphere, the presence of volatile iodine species may result from chemical reactions. Various computer codes are available which provide predictions of chemical behavior in these four areas of importance. The results demonstrate the important role chemistry can have in affecting release of radionuclides to the environment.

47510 (NUREG/CP—0078, pp 5.11-5.22) **Chemistry and source terms - some thoughts from UK perspective.** Clough, P.N. (UKAEA Safety and Reliability Directorate, Culcheth). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The source term component of the PRA completed for the PWR proposed for Sizewell in the UK employed WASH-1400 methodology, and the results were presented as 'first estimates' at the Public Inquiry held on the proposed reactor. 'Second estimate' source terms, employing a discrete probability distribution approach and aimed at updating WASH-1400 ideas, were also presented at the Inquiry. The chemistry assumptions in these treatments, and the scrutiny they received at the Inquiry are reviewed. A resume of UK activities directed towards an improved understanding of chemistry in severe accidents is presented and some views on how the wide-ranging chemical interactions revealed by recent research should be handled in source term treatments are put forward.

47511 (NUREG/CP—0078, pp 5.23-5.28) **Regulatory simplification of fission product chemistry.** Read, J.B.; Soffer, L. (Nuclear Regulatory Commission, Washington, DC). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The requirements for design provisions intended to limit fission product escape during reactor accidents have been based since 1962 upon relatively simple but conservative assumptions regarding fission product release. Since that time, significant advances in our understanding of severe accident phenomena have occurred. The possibility of a new set of assumptions to replace the 1962 set which employs our latest understanding of the potential chemical processes involving fission products in severe accidents, as well as existing plant safety features designed to limit off-site consequences, are discussed.

47512 (NUREG/CP—0078, pp 5.29-5.34) **Models for aerosol rate processes in nuclear reactor source term studies.** Loyalka, S.K. (Univ. of Missouri, Columbia). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Severe nuclear plant accidents can lead to formation and evolution of aerosol particles under gradients of concentration, pressure, temperature, and so forth. The aerosols, in turn, influence strongly the development of the accidents and the source terms. Aerosol rate processes (growth, coagulation, deposition) therefore play an important role in mechanistic studies of the source terms, and it is necessary to have rate models based on sound physiochemical analyses and experiments. It is the purpose of this paper to review briefly the state of single and two particle aerosol mechanics, and to provide an assessment of the applicability and accuracy of the rate models in use in the nuclear source term studies. An approach towards cataloging and standardization of the data base is discussed, and needs for further theoretical and experimental research are emphasized.

47513 (NUREG/CP—0078, pp 5.35-5.47) **Risk-significance of chemical issues affecting the source term.** Williams, D.C.; Griesmeyer, J.M. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

Under NRC sponsorship, Sandia National Laboratories is implementing the Severe Accident Risk Reduction Program (SARRP), in which severe accident risks are being evaluated in selected nuclear power plants representing the major US plant types. Efforts to evaluate the uncertainties in the risk estimates, and identify major contributors to these uncertainties, constitute an important part of the SARRP program. Techniques used include regression analysis of results obtained through Monte Carlo studies employing Latin hypercube sampling. This paper presents and compares results obtained for the Surry, Sequoyah, Peach Bottom and Grand Gulf plants, with emphasis upon uncertainties in the source term area. Important uncertainties are found to include those involving iodine chemistry, high-temperature fission product chemistry, phenomena involved in the high-pressure ejection of corium into the containment, and radionuclide release during corium-concrete interactions. The importance of various issues depends strongly upon the specific accident sequence and plant type.

47514 (NUREG/CP—0078, pp 5.49-5.62) **Impact of chemical phenomena in direct containment heating.** Williams, D.C.; Bergeron, K.D.; Carroll, D.E.; Tills, J.L. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Calculations have been performed for direct containment heating (DCH) scenarios in the Surry plant using the CONTAIN code for severe accident analysis. Results suggest that DCH can be

a severe threat for this plant if any only if there is substantial chemical energy release due to oxidation of metal in the dispersed corium. It is found that most of the metal oxidation is due to reaction with steam in the oxygen-poor lower portions of the containment, which releases substantially less energy than does reaction with oxygen but which produces copious hydrogen. A crucial question then becomes the fate of this hydrogen when and if the mixture of hot steam, hydrogen, and debris reaches the oxygen-bearing atmosphere of the upper containment. Peak pressures are also sensitive to the timing and magnitude of concurrent steam sources from vessel blowdown and vaporization of cavity water. Over a significant range of the relevant parameter space, these issues affect the results more than do the questions of debris-structure interaction which have traditionally dominated DCH discussions.

47515 (NUREG/CP—0078, pp 5.63-5.65) **Integrated model for sensitivity and cost/benefit analysis for severe accidents.** Haenni, H.P. (Safety and Reliability Consult, Gebenstorf, Switzerland). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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An integrated model and method for sensitivity and cost/benefit analysis will be suggested which helps to understand the uncertainty in the overall PRA and especially in the uncertainty on the three safety levels; due to incomplete understanding of chemical processes on level 2. A similar formulae may be used. An evaluation of the different retention or decontamination factors of radionuclides in the primary system and in the containment considers the time-dependancy of the thermo-hydraulic conditions. An improvement of ESF on level 1 and 2 leads to a cost/benefit analysis. Two safety guide lines are integrated in this model to support the postulation that by good performance of all available mitigating measures the residual risk to the environment is negligible or small.

47516 (NUREG/CP—0078, pp 6.1-6.14) **The chemistry of fission product iodine under nuclear reactor accident conditions.** Malinauskas, A.P.; Bell, J.T. (Oak Ridge National Lab., TN). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

The radioisotopes of iodine are generally acknowledged to be the species whose release into the biosphere as a result of a nuclear reactor accident is of the greatest concern. In the course of its release, the fission product is subjected to differing chemical environments; these can alter the physicochemical form of the fission product and thus modify the manner and extent to which release occurs. Both the chemical environments which are characteristic of reactor accidents and their effect in determining physical and chemical form of fission product iodine have been studied extensively, and are reviewed in this report.

47517 (NUREG/CP—0078, pp 6.15-6.28) **Iodine chemical reactions considered in German PWR core-melt accident risk evaluation.** Neeb, K.H.; Hosemann, J.P. (Kraftwerk Union AG, Erlangen, Germany; Kernforschungszentrum, Karlsruhe, Germany). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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In this German PWR core-melt risk evaluation, fission product iodine behavior and transport is calculated using the IMPAIR code, taking into account chemical reactions according to the actual state of knowledge. In order to obtain well-characterized environmental conditions the accident sequence is divided into several subsections. In each subsection chemical reactions of iodine as well as water-vapor phase partitioning are considered according to the results of experimental and theoretical investigations. The resulting concentrations of different iodine species from one subsection are taken as input data for the following subsection. The IMPAIR code is used in treating all parts of the accident sequence from the beginning of the core melt-down to the containment sump water evaporation and iodine behavior in the reactor building annulus. Actual results are presented.

47518 (NUREG/CP—0078, pp 6.29-6.43) **Iodine behavior in containment under LWR accident conditions.** Wisbey, S.J.; Beahm, E.C.; Shockley, W.E.; Wang, Y.M. (Oak Ridge National Lab., TN). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

The description of containment iodine behavior in reactor accident sequences requires an understanding of iodine volatility effects, deposition and revaporization/resuspension (from surfaces and aerosols), chemical changes between species, and mass transport. The experimental work in this program has largely centered on the interactions of iodine in or with water pools. The formation of volatile iodine, as I_2 or organic iodides, is primarily dependent on radiation and solution pH. Lower pH results in increased formation of volatile iodine species; thus, for example, a pH of 3.05 resulted in a conversion of I^- to I_2 that was more than two orders of magnitude greater than tests run at pH 6.1 or 6.8. The formation or organic iodides involving water pools has been linked to the presence of iodine as I_2, the solution/gas contact, and to the type of organic material.

47519 (NUREG/CP—0078, pp 6.45-6.57) **Interaction of caesium iodide with boric acid under severe reactor accident conditions.** Bowsher, B.R.; Dickinson, S.; Grubb, S.R.; Ogden, J.S.; Young, N.A. (UKAEA Atomic Energy Establishment, Winfrith; Univ. of Southampton, England). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

The interaction of caesium iodide with boric acid has been studied over the temperature range 100 to 1000°C under a variety of conditions. Experiments have been performed to characterise the mechanism and products of the reaction and to assess the likelihood and extent of the reaction in severe reactor accidents. Substantial decomposition of caesium iodide was observed in the presence of boric acid at temperatures above 600°C with the production of non-volatile caesium borates and volatile iodine species. Matrix isolation-infrared and quadrupole mass spectrometric studies have demonstrated that the volatile iodine species is hydrogen iodide. The extent of the reaction depends on the phenomenology of the accident; however, vacuum-line studies of the vapour-phase reaction have shown that greater than 70% decomposition of the caesium iodide can occur. Caesium iodide decomposition does not necessarily increase the risk associated with severe reactor accidents: hydrogen iodide is highly reactive and primary circuit retention of iodine could be increased for some accident sequences if all the fission product iodine was assumed to be present as hydrogen iodide.

47520 (NUREG/CP—0078, pp 6.59-6.72) **Analysis of iodine chemical form for the severe fuel damage scoping test and 1-1 test.** Cronenberg, A.W.; Osetek, D.J.; Reed, P.R. (ESA, Inc., Idaho Falls, ID; Idaho National Engineering Lab., Idaho Falls; Nuclear Regulatory Commission, Washington, DC). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Recent data from severe fuel damage (SFD) experiments suggest iodine chemical behavior that is tied to fuel burnup and fission product concentration levels in the steam/H_2 effluent. Analysis indicate that at low-burnup conditions atomic I release from fuel is favored. In addition, a comparison of reaction kinetics predictions of I and Cs chemical form after release into a steam/H_2 environment, with data from recent SFD experiments, illustrates the importance of system conditions on the partitioning of iodine between CsI and HI. Results indicate that the time to establish thermochemical equilibrium and ultimate chemical species is largely determined by concentration and temperature conditions. For the trace-irradiated fuel and high-steam flow conditions of the SFD-Scoping Test the predominant form of iodine within the fuel bundle is predicted to be HI, whereas predominantly CsI is predicted for the trace-irradiated, low-steam flow conditions of the SFD 1-1 test.

47521 (NUREG/CP—0078, pp 6.73-6.85) **CONTAIN code calculations of the effects on the source term of CsI to I_2 conversion due to severe hydrogen burns.** Valdez, G.D.; Williams, D.C. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

In experiments conducted at Sandia National Laboratories large amounts of elemental iodine were produced when CSI-Al_2O_3 aerosol was exposed to hydrogen/air combustion. To evaluate some of the implications of the iodide conversion (observed to occur with up to 75% efficiency) for the severe accident source term, computational simulations of representative accident sequences were conducted with the CONTAIN code. The following conclusions can be drawn from this preliminary source term assessment: (1) if the containment sprays are inoperative during the accident, or failed by the hydrogen burn, the late-time source term is almost tripled when the iodide is converted to I_2; (2) with the sprays active, the amount released without conversion of the CsI aerosol is 63% higher than for the case when conversion occurs; (3) for the case where CsI is converted to I_2 continued operation of the sprays reduces the release by a factor of 40, relative to the case in which the sprays fail at the time of the hydrogen burn. When there is no conversion, the reduction factor for continued spray operation is about a factor of 9, relative to the failed spray case.

47522 (NUREG/CP—0078, pp 6.87-6.94) **Capture of iodine in pressurized water reactor ice condensers.** Owczarski, P.C.; Winegardner, W.K. (Pacific Northwest Lab., Richland, WA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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When analyzing postulated severe core melt accidents in light water reactors, there is concern that volatile forms of iodine such as elemental iodine (I_2) and organic iodide (represented by methyl iodide, CH_3I) might exist in addition to solid (particulate) phase cesium iodide (CsI) in reactor containment gases. Pacific Northwest Laboratory has developed the computer code ICEDF that estimates the ice condenser decontamination factors (DFs) for each of the three chemical species. Particles are scrubbed effectively by steam condensation and, if the particles are large, by gravity settling. I_2 is scrubbed very effectively if the ice meltwater is alkaline. CH_3I is partially scrubbed when high steam mole fractions are encountered. During a typical accident sequence when ice is present, DFs range from 1 to 2 for CH_3I, from 50 to 600 for particulate CsI, and 3E+9 to 5E+10 for I_2. After all ice is melted, these DFs are approximately 1, 2, and 2, respectively.

47523 (NUREG/CP—0078, pp 6.95-6.106) **Assessment of effect of dissolved species on stable droplet sizes in PWR containments post fault.** Longworth, J.P. (Berkeley Nuclear Labs., England). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

Many fission products including the more radiologically significant exist in water soluble chemical forms. The behaviour of water is therefore an important aspect of predicted fission product behaviour in faults ranging from the low consequence design basis faults to the low probability severe accidents. This paper focusses on the stability of the size distribution of water droplets suspended in the containment atmosphere arising from the fine balance between the raising of the water vapour pressure above a curved surface and its lowering due to the presence of dissolved species. A model for predicting the stable size is developed from established physico-chemical theory and illustrated by application to a case where the suspended aerosol arises from fragmentation of a flashing water jet.

47524 (NUREG/CP—0078, pp 6.107-6.118) **The Formation of organic iodides following reactor accidents.** Paquette, J.; Wren, J.C. (Whiteshell Nuclear Research Establishment, Pinawa, Manitoba). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The formation of organic iodides can have an important impact on the volatility of radioiodine following a nuclear reactor accident. Despite several studies on the subject over the last fifteen years, the origin of organic iodides under these conditions has not been clearly established. Various chemical mechanisms are possible, including thermal and radiolytic reactions in the gaseous phase, at surfaces, and in the aqueous phase. This paper discusses the possible mechanisms for the formation of organic iodides under chemical conditions typical of nuclear reactor accidents. Of particular importance are the reactions of iodine species with dissolved organic impurities in the aqueous phase of the containment building. Examples from the experimental work of the authors are presented.

47525 (NUREG/CP—0078, pp 6.119-6.136) **Experimental study of radiolytic effect on dilute aqueous iodide solution.** Shiraishi, Hirotsugu; Ishigure, Kenkichi. (Univ. of Tokyo, Japan). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The effect of radiation on the chemical form of iodine was examined by use of a flow system installed in a Co^{60} irradiation room. Deaerated cesium iodide solutions of 10^{-4}, 10^{-5} and 10^{-6} M were irradiated at 25°C. It was found that the irradiated solution reaches rapidly to an approximate stationary state where the balance between oxidation and reduction is attained with a specific distribution of iodine species. The features of the balanced state vary substantially with the pH of the solution as well as with the initial iodide concentration. A low yield of I_3^- was formed in neutral 10^{-4} and 10^{-5} M solutions. While the I_3^- yield increased considerably at pH 5, hardly any oxidation was observed at pH 9. In 10^{-5} M solutions the product distribution changed gradually with irradiation time. A significant post-irradiation reaction was also noted for these solutions. In 10^{-6} M solution IO_3^- was the only major product except in an initial short period, and the effect of variation in pH was much less significant. The kinetics in these irradiated solutions were discussed in some detail.

47526 (NUREG/CP—0078, pp 6.137) **Measurements of rates of some reactions related to radiolytic effect on aqueous iodide solution.** Shiraishi, Hirotsugu; Okuda, Hiroaki; Ishigure, Kenkichi. (Univ. of Tokyo, Japan). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

47527 (NUREG/CP—0078, pp 7.1-7.36) **Radionuclide release and aerosol generation during core debris interactions with concrete.** Powers, D.A; Brockmann, J.E. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The VANESA model predicts the release of radionuclides and generation of aerosols associated with core debris interactions with concrete during severe reactor accidents. The technical bases for the VANESA model are described. Some comparisons of the model predictions to the results of high temperature melt/concrete interaction tests are shown. These results show the VANESA model predictions are in good agreement with the limited amount of available experimental data. The VANESA model has been applied to numerous severe accident analyses. In general, the model predicts aerosol production during core debris/concrete interactions lasts far longer than was previously supposed. It is also found that releases of radionuclides during the interactions are quite dependent on the specific features of the plant and accident in question. Both the extent of release and the timing of release of tellurium and refractory radionuclides can be quite different than was predicted by earlier, supposedly bounding, models. Another important finding from the VANESA model is that water overlying core debris attacking concrete can attenuate significantly the emission of both radioactive and non-radioactive aerosols.

47528 (NUREG/CP—0078, pp 7.37-7.60) **Hydrogen generation during fuel-coolant interactions.** Young, M.F.; Berman, M.; Pong, L.T. (Sandia National Labs., Albuquerque, NM; Technadyne Corp., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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During a severe nuclear plant accident, molten fuel can contact water in the core region, the lower plenum, or in the cavity below the reactor vessel. The interactions that take place can vary from benign boiling to explosive vaporization. If the fuel contains a metallic component, rapid oxidation of the metal can occur during the fuel-coolant interaction (FCI). The hydrogen generated from this reaction can increase the threat to containment integrity. Experiments have been conducted with 10 to 20 kg of two kinds of thermite-generated molten fuel simulants: corium and iron-aluminum oxide. Both saturated and subcooled water were employed as coolants. Explosive and non-explosive FCIs were observed. Up to 30% of the metal was reacted in some cases. For some of the tests, the extent of reaction appeared to depend more on the water subcooling than on the degree of fragmentation as measured by post-test sieving. Models of hydrogen generation are proposed and compared to a broad range of experiments. Predictions agree qualitatively with many of the experimental observations. A more accurate model of hydrogen generation would have to be coupled to a dynamic thermal-hydraulic calculation of the important phases of an FCI: coarse mixing, fine fragmentation, explosion propagation and vapor expansion.

47529 (NUREG/CP—0078, pp 7.61-7.84) **Fission product release from core-concrete melts.** Tetenbaum, M.; Fink, J.K.; Johnson, C.E.; Chasanov, M.; Gunther, W.H.; Spencer, B.W.; Ritzman, R.L.; Seghal, R. (Argonne National Lab., IL; Electric Power Research Inst., Palo Alto, CA). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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Based on measurements with a He-H_2O carrier gas, fractional release values for lanthanum, barium, and strontium gaseous fission product species have been obtained from small scale core-concrete melts at 2155 and 2385 K. The sample configuration consisted of a layer of limestone chips, a layer of urania fuel granules containing La_2O_3, BaO, and SrO in solid solution, and a metal layer consisting of a mixture of stainless steel and Zircaloy between the fuel and concrete. The following trends in fission product release fraction values were found: Ba>Sr>La. Release fraction values based on measured release of fuel, cladding, structural, and concrete species will be presented. Intermediate-scale tests were carried out in which direct electrical heating was used to sustain an interaction between fully oxidized molten-core materials (UO_2, ZrO_2, Fe_2O_3, Cr_2O_3, NiO, CaO, SiO_2, and La_2O_3) and a basemat of limestone concrete. The corium reached temperatures of 2300 K before the vigorous gas sparging process had ejected most of the corium material from the crucible. UO_2 was not detected in the aerosol generated; however, ZrO_2 was present as was amorphous silica.

47530 (NUREG/CP—0078, pp 7.85) **Rates of chemical heating and atmospheric heating during core debris expulsion from a pressurized vessel.** Powers, D.A.; Tarbell, W.W.; Brockmann, J.E.; Pilch, M. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

From 192. American Chemical Society national meeting; Anaheim, CA, USA (7 Sep 1986).

47531 (NUREG/CP—0078, pp 7.87-7.94) **CSNI source term task force review.** Torgerson, D.F. (Whiteshell Nuclear Research Establishment, Pinawa, Manitoba). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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During late 1984/early 1985, several new source term studies were completed that have had broad, international implications for nuclear safety and regulatory issues. Owing to the importance of this new information, the CSNI established a Special Task Force on Source Terms to intercompare the studies. The specific objectives were to identify where source term information appears to be sufficient, where the studies disagree, and to look at the applicability of the information to different LWR plants. An essential aspect of the work was to establish the remaining uncertainties, and to determine whether these uncertainties were significant. This paper summarizes the main findings of the Task Force.

47532 (NUREG/CP—0078, pp 7.97-7.100) **Status of chemical research and the analysis of severe reactor accidents.** Powers, D.A. (Sandia National Labs., Albuquerque, NM). Jun 1987. NTIS, PC A99/MF A01 - GPO. File Number DE87900833. (CONF-860911—Pt.1).

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The status of chemistry as a recognized feature of severe reactor accident phenomena could not be better. The crucial step in establishing the need to understand the chemical processes of severe reactor accidents seems to have been the decision by the US Nuclear Regulatory Commission to undertake realistic, mechanistic analyses of radionuclide behavior under severe reactor accident conditions. To do this, deliberately conservative or supposedly bounding assumptions concerning the escape of radionuclides from degrading reactor fuel have been abandoned. In the place of these assumptions are detailed models of physical and chemical processes affecting radionuclides. All radionuclides, including radionuclides usually considered to be quite refractory such as barium, cerium and ruthenium, must be included in the analyses.

47533 (NUREG/CR—4946) **Davis-Besse uncertainty study.** Davis, C.B. (EG and G Idaho, Inc., Idaho Falls (USA); Nuclear Regulatory Commission, Washington, DC (USA). Div. of Reactor and Plant Systems). Aug 1987. Contract AC07-76ID01570. 80p. (EGG—2510). NTIS, PC A05/MF A01 - GPO. File Number DE87013628.

The uncertainties of calculations of loss-of-feedwater transients at Davis-Besse Unit 1 were determined to address concerns of the US Nuclear Regulatory Commission relative to the effectiveness of feed and bleed cooling. Davis-Besse Unit 1 is a pressurized water reactor of the raised-loop Babcock and Wilcox design. A detailed, quality-assured RELAP5/MOD2 model of Davis-Besse was developed at the Idaho National Engineering Laboratory. The model was used to perform an analysis of the loss-of-feedwater transient that occurred at Davis-Besse on June 9, 1985. A loss-of-feedwater transient followed by feed and bleed cooling was also calculated. The evaluation of uncertainty was based on the comparisons of calculations and data, comparisons of different calculations of the same transient, sensitivity calculations, and the propagation of the estimated uncertainty in initial and boundary conditions to the final calculated results.

47534 (NUREG/CR—5008) **Development of a testing and analysis methodology to determine the functional condition of solenoid operated valves.** Meininger, R.D.; Weir, T.J. (Pentek, Inc., Coraopolis, PA (USA); Nuclear Regulatory Commission, Washington, DC (USA). Div. of Engineering). Sep 1987. 34p. NTIS, PC A03/MF A01 - GPO. File Number DE87900990.

This report describes research conducted to develop and test a technique to determine the functionality of solenoid operated valves (SOVs) in a nuclear plant based on the measurement and analysis of inrush current. The technique developed uses a clip-on current probe, thus enabling all measurements to be made from outside the reactor building without disturbing any electrical connections. The inrush current to the solenoid operated valve is analyzed in real time using a personal computer and Fast Fourier Transform (FFT) techniques.

47535 **(WAPD-TM—1546) Light Water Breeder Reactor (LWBR) flow coefficient of reactivity: (LWBR Development Program).** Sarber, W.K.; Stout, J.W.; Atherton, R. (ed.). (Bettis Atomic Power Lab., West Mifflin, PA (USA)). Jun 1987. Contract AC11-76PN00014. 98p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000015.

This report discusses the results of an experimental program to measure and categorize the causes for increases in the magnitude of the LWBR flow coefficient of reactivity at 10,932 EFPH from previously measured near zero values to a value of about 6×10^{-4} Δ rho for a flow decrease from 100 to 80% of full flow. Reactor protection analyses confirmed that existing protection systems were adequate for continued operation. Subsequently, the flow coefficient decreased in magnitude to approximately 2.25×10^{-4} Δ rho at 20,000 EFPH and remained about constant through the remainder of core life, 29,047 EFPH. The increase in flow coefficient of reactivity is attributed to a flow-force dependent change in the effective core diameter such that an increase in core flow decreased the core diameter, resulting in an increase in fuel-to-water ratio and a consequent decrease in the reactivity of this relatively undermoderated core. This report discusses why the increased flow coefficient did not occur until after 10,932 EFPH and why the magnitude of flow coefficient reduced with continued core operation.

47536 **Development of safety goals for nuclear power plants.** Rathbun, D.; Modarres, M. (Nuclear Regulatory Commission, Washington, DC). *Nuclear Safety;* **28**: No. 2, 155-163(Apr-Jun 1987).

This article presents an overview of the historical development of safety goals for nuclear power plants, including the July 30, 1986, safety goal policy. In the course of the Nuclear Regulatory Commission's evaluation of safety goals, several issues have emerged. In particular, the benefit-cost guideline and the core-melt design objective have been subjects of continuing scrutiny and debate. These and other issues remaining to be resolved for completing the development of a final policy are discussed. Finally, the current status of the safety goals policy is discussed.

47537 **New procedure for the safe, economical seismic design of components of nuclear plant facilities at low and moderate seismicity sites.** Stevenson, J.D. (Stevenson and Associates, Cleveland, OH). *Nuclear Safety;* **28**: No. 2, 173-180(Apr-Jun 1987).

Current methods of seismic design and analysis of nuclear facility components using modal analysis and dynamically uncoupled elastic-response-spectra techniques are expensive, time consuming, and greatly overestimate real seismic loads. In this article a new, simplified load-coefficient method is presented for use at low and moderate seismicity sites which should reduce seismic analytical costs by a factor of 5 or more and correlate better with the observed behavior of mechanical and electrical components in real, strong motion earthquakes.

47538 **Fast reactor safety: the convergence of principles and practice.** Quick, M.V.; Hall, R.S.; Grieve, M.S.; Buttery, N.E. *Nuclear Safety;* **28**: No. 2, 181-190(Apr-Jun 1987).

This article discusses the progress made in recent years in liquid-metal fast breeder reactor design and development toward complying with the safety principles and criteria in use in the United Kingdom. Topics covered are the achievement of adequate redundancy and diversity in safety-related systems, the importance of primary circuit structures, and the need for a well-developed case for local faults. In addition, internal and external hazards and progress in defining the role of containment in the overall safety case are discussed. Achieving the required degree of safety without adversely affecting reactor operation and load factor is emphasized.

47539 **Leak-detection technology for reactor primary systems.** Kupperman, D.S.; Claytor, T.N.; Mathieson, T.; Prine, D. (Argonne National Lab., IL). *Nuclear Safety;* **28**: No. 2, 191-198(Apr-Jun 1987).

Current leak-detection practices in 74 operating nuclear reactors were reviewed. Existing leak-detection systems are adequate to ensure a leak-before-break scenario in most situations; but no single method currently available combines optimal leakage-detection sensitivity, leak-locating ability, and leakage measurement accuracy. Simply tightening current leakage limits may produce an unacceptably large number of unnecessary shutdowns. Use of commercially available acoustic monitoring systems or moisture-sensitive tape may improve leak-detection capability at specific sites. However, neither of these methods currently provides source discrimination distinction or leak-rate information. An acoustic leak-detection system that can be implemented in the field is being developed to address these limitations.

47540 **Loss-of-flow-without-scram tests in Experimental Breeder Reactor-II and comparison with pretest predictions.** Chang, L.K.; Mohr, D.; Planchon, H.P. (Argonne National Lab., IL). *Nuclear Safety;* **28**: No. 2, 199-211(Apr-Jun 1987).

This article discusses a series of successful loss-of-flow-without-scram tests conducted in Experimental Breeder Reactor-II (EBR-II), a metal-fueled, sodium-cooled fast reactor. These May 1985 tests demonstrated the capability of the EBR to reduce reactor power passively during a loss of flow and to maintain reactor temperatures within bounds without any reliance on an active safety system. The tests were run from reduced power to ensure that temperatures could be maintained well below the fuel-clad eutectic temperature. Good agreement was found between selected test data and pretest predictions made with the EBR-II system analysis code NATDEMO and the hot channel analysis code HOTCHAN. The article also discusses safety assessments of the tests as well as modifications required on the EBR-II reactor safety system for conducting required on the EBR-II reactor safety system for the conducting the tests.

47541 **Fuel performance annual report.** Bailey, W.J.; Dunenfeld, M.S. (Pacific Northwest Lab., Richland, WA). *Nuclear Safety;* **28**: No. 2, 221-236(Apr-Jun 1987).

This article summarizes NUREG/CR-3950 (PNL-5210), vols. 1 and 2, entitled Fuel Performance Annual Report for 1983 and Fuel Performance Annual Report for 1984, respectively. These reports, the sixth and seventh in a series, were published in March 1985 and March 1986, respectively, to provide a summary description of fuel performance in commercial nuclear power plants during 1983 and 1984. Brief summaries of fuel design changes, fuel surveillance programs, fuel operating experience, fuel problems, high burnup fuel experience, and items of general significance are provided. References to additional, more detailed information and related Nuclear Regulatory Commission evaluations are included.

47542 **Chernobyl accident sequence.** Kress, T.S.; Jankowski, M.W.; Joosten, J.K.; Powers, D.A. (Oak Ridge National Lab., TN). *Nuclear Safety;* **28**: No. 1, 1-9(Jan-Mar 1987).

A historic meeting was held Aug. 25-29, 1986, in Vienna, Austria. A delegation of U.S.S.R. experts presented detailed information on the design characteristics of the RBMK-1000 type of reactor and their evaluation of all aspects of the Chernobyl accident, including causes, events, measured releases, mitigation efforts, response measures taken, atmospheric transport, and the consequences. This article was developed as a result of the authors' participation in this meeting and participation in additional one-on-one interactions with the U.S.S.R. experts. An overview is presented of the important design features, the ill-fated experiment, and the significant events up to the time of the initial excursion.

47543 **Chernobyl source term.** Powers, D.A.; Kress, T.S.; Jankowski, M.W. (Sandia National Labs., Albuquerque, NM). *Nuclear Safety;* **28**: No. 1, 10-28(Jan-Mar 1987).

Much of the information made available by the U.S.S.R. on the release of radionuclides during the reactor accident at the Chernobyl Atomic Energy Station is described. The release of radionuclides took place in two stages. The first, which was brief but intense, can be understood in terms of the known behavior of reactor fuel during reactivity insertion accidents and the interactions of high-temperature fuel with water and air. The second, which lasted for nine days, may be understood from the physical and chemical behavior of the fuel in the core region.

47544 **Chernobyl accident - its impact on Sweden.** Reisch, F. (SKI, Stockholm, Sweden). *Nuclear Safety;* **28**: No. 1, 29-36(Jan-Mar 1987).

The impact of the Chernobyl accident on Sweden is presented in the following areas of interest: early chronology of the emergency in Sweden, emergency organization, results of ground and air measurements impact on foodstuffs, countermeasures and their effects, estimated radiation doses, and information to the public.

47545 **Onsite response to the accident at Chernobyl (accident management).** Jankowski, M.W.; Powers, D.A.; Kress, T.S. (International Atomic Energy Agency, Vienna, Austria). *Nuclear Safety;* **28**: No. 1, 36-42(Jan-Mar 1987).

In summarizing the information provided in the USSR report on plant stabilization shortly after the accident at Chernobyl and on the early response measures, the following three main stages can be identified: (1) the building fire-fighting actions and measures (techniques) undertaken and their effectiveness in controlling and finally extinguishing the fire; (2) the short-term stabilization of the plant immediately following the accident; and (3) the long-term recovery, including entombment of the damaged unit and the monitoring of the evolution and long-term stability of the entombed core debris and reactor building. Clearly, the information provided in the USSR report and the additional discussions indicated the importance of accident management. The science and technology of nuclear accident management has not been neglected in the nuclear field; however, attention to this aspect of nuclear safety research has been necessarily largely theoretical. Consequently the practical and very successful experience at the Chernobyl site is of great interest and should be further analyzed and documented.

47546 **Understanding aging: a key to ensuring safety.** Arlotto, G.A. (Office of Nuclear Regulatory Research, Washington, DC). *Nuclear Safety;* **28**: No. 1, 46-51(Jan-Mar 1987).

A vital phenomenon in ensuring the safety of operating nuclear power plants is aging; it affects, for example, the defense-in-depth principle and common mode failure. Previous work on aging helped resolve the problem of pressurized thermal shock and recirculation pipe cracking. Although much has already been learned about aging and degradation processes, significant questions remain unanswered. The Nuclear Regulatory Commission has therefore developed a research program to study the aging of systems and components considered to have a potential impact on plant safety. Not merely an academic exercise, as the operating nuclear power plants advance in age, this program will provide practical assistance in achieving greater safety.

47547 **In-pile experiments and analysis of the coolability of UO_2 debris in sodium.** Mitchell, G.W.; Rivard, J.B.; Lipinski, R.J.; Hitchcock, J.T.; Kelly, J.E.; Ottinger, C.A.; Gronager, J.E.; Schmidt, T.R.; Meister, H.; Mehr, K.; Takahashi, K. (Sandia National Lab., Albuquerque, NM). *Nuclear Safety;* **28**: No. 1, 52-62(Jan-Mar 1987).

A program to study the coolability of debris beds that might be formed during reactor accidents was performed under the sponsorship of the US Nuclear Regulatory Commission, the Joint Research Centre of the European Communities, and the Power Reactor and Nuclear Fuel Development Corporation of Japan. The program, conducted at Sandia National Laboratories, was completed in 1985. This article provides a review of the program's 12 in-pile experiments and the data obtained from them. They are the first coolability experiments to be conducted in-pile using internally heated urania in sodium. An analytical model based on these experiments for describing the coolability characteristics of such debris is also presented.

47548 **Quality control measurements of airborne radionuclides from nuclear power plants in the Federal Republic of Germany.** Winkelmann, I.; Fields, D.E. (Institute for Radiation Hygiene of the Federal Health Office, West Germany). *Nuclear Safety;* **28**: No. 1, 63-70(Jan-Mar 1987).

The Institute of Radiation Hygiene of the Federal Health Office operates a quality control program to evaluate and disseminate data collected at nuclear power plants in the Federal Republic of Germany. This program has several features that should be considered by those responsible for characterizing radionuclide emissions from such power plants. One part of the quality control efforts consists of intercomparisons and calibration measurements during the initial phase of plant operation. Subsequent activities include monitoring and repeated standardization studies that ensure continued quality in the measurements of emissions of radioactive particulates, radioactive iodine, alpha-emitting radionuclides, tritium, and radioactive noble gases. A program for monitoring C-14 has also been in effect at the Federal Health Office since 1976, but these measurements have not been used for quality control comparisons except at selected plants.

47549 **Relative importance of individual elements to LWR accident consequence estimates assuming equal release fractions.** Alpert, D.J.; Chanin, D.I.; Ritchie, L.T. (Sandia National Labs., Albuquerque, NM). *Nuclear Safety;* **28**: No. 1, 77-86(Jan-Mar 1987).

This article examines the relative importance to offsite consequences of radioactive elements in a nuclear reactor core; an equal fraction of the inventory of each element is assumed to be released. Studies of reactor accident source terms can use these results to identify the elements that are likely to be the more important contributors to offsite consequences. The inventory of radionuclides for a 3 412-MW(t) pressurized-water reactor (PWR) was calculated with the SANDIA-ORIGEN code. Of the 89 elements considered by ORIGEN, only approximately 25 could be important contributors to offsite consequences. The relative radiological importance of the 25 elements was determined with the MELCOR Accident Consequence Code System. Of the 25 elements, 60 nuclides were examined by using the inventory of a 3 412-MW(t) PWR. The relative importance of each element was determined for both early and long-term consequences. A number of elements could be important to early and long-term doses if released in sufficiently large quantities. However, to be important for early health effects, an element must be released to the environment before sufficient time elapses for an effective emergency response.

47550 **Causes and effects of vital instrumentation and control power supply bus failures.** Muhlheim, M.D.; Murphy, G.A. (JBF Associates, Inc., Knoxville, TN). *Nuclear Safety;* **28**: No. 1, 90-97(Jan-Mar 1987).

This article presents the results of a study in which the objective was to evaluate nuclear power-plant operating experience to identify the causes and the effects of vital instrumentation and control (I & C) power supply bus failures. Vital I & C power is normally provided to essential instrumentation and controls through either vital d-c or a-c power supply systems. The vital d-c power supply system generally provides control power for starting the diesel generators, for operating electrical circuit breakers, and for controlling various logic circuits. The vital d-c power system also supplies vital a-c power through an inverter. The vital a-c power supply system generally feeds the reactor protection system channels, the engineered safety features actuation system channels, and critical instrumentation in the control room. The leading cause of vital bus failures is inverter failures; other causes are human errors, battery charger failures, and miscellaneous failures. The effects of these failures are that the margin of safety can be degraded by (1) denying key information to the operators, (2) inducing plant transients, (3) causing safety injection actuations, and (4) causing the loss of shutdown cooling flow.

47551 **Reliability data required for a seismic risk assessment.** Wells, J.E. (Lawrence Livermore National Lab., CA, USA). pp 374-383 of Reliability data collection and use in risk and availability assessment. Proceedings. Wingender, H.J. (ed.). Berlin, Germany, F.R.; Springer (1986). (CONF-8604265—).

From 5. EuReData conference on reliability data collection and use in risk availability assessment; Heidelberg, F.R. Germany (9 Apr 1986).

A methodology overview of seismic risk analysis is presented along with brief descriptions of each step of the methodology. Once the methodology has been described, a detailed discussion of the required seismic reliability data (fragilities) will be presented. This discussion will describe the fragility development process and a summary of the fragilities used in the LaSalle BWR seismic risk analysis. Fragilities were developed for all structural elements in

the critical structures. Equipment fragilities were treated in two ways. LaSalle specific fragilities were derived for major components (e.g., reactor pressure vessel, pumps, etc.) and generic fragilities were used for the remaining components.

25 ENERGY STORAGE

2502 Compressed Gas

REFER ALSO TO CITATION(S) 47122, 47123

47552 (EPRI-AP—5301, pp 2.1-2.27) **Basic geology.** Little, C.B. (Panhandle Eastern Pipe Line Co.). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

An outline is presented of basic geology concepts as applied to the storage of energy products. The information is presented under the following topics: (1) reservoir rocks, (2) how can rocks be used as a reservoir, and (3) types of reservoirs.

47553 (EPRI-AP—5301, pp 3.1-3.38) **CAES siting potential in the United States.** Foh, S. (Institute of Gas Technology, Chicago, IL). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

The USA potential for siting Compressed Air Energy Storage (CAES) facilities is outlined. The objectives of the study include indications of areal extent of different CAES media and stages of siting exercise. The approach used and a regional siting evaluation are presented.

47554 (EPRI-AP—5301, pp 4.1-4.23) **CAES development in aquifer porous media.** Katz, D.L. (Univ. of Michigan, Ann Arbor). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

Based on experience with aquifers developed and used successfully for natural gas storage since the 1950's, method for locating, developing, and using aquifers for air storage are presented. Air will behave like natural gas in flow through porous media, in displacement of water, and in flow through pipes. Air is more viscous and dense than natural gas, but adjustments are made easily in calculations. Air can be corrosive to steel as compared to natural gas and it has been found to react with minerals present in the storage rock at Pittsfield. Compressed Air Energy storage is expected to operate on a major daily cycle and a minor weekly cycle. Natural gas storage operates primarily on an annual cycle, with peak rates related to cold weather. Gas storage is an important part of the gas delivery system and has functioned well in handling peak loads as needed. It is believed that the technical knowledge is ample to support a successful CAES facility utilizing an aquifer.

47555 (EPRI-AP—5301, pp 5.1-5.23) **CAES development in gas-bearing porous media.** Whims, M.J. Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

The technical underground storage requirements for CAES and for natural gas are similar. The reservoir engineering techniques for natural gas are directly applicable to air because both are gases which behave in accordance with the same gas laws when adjusted for the differences in chemical and physical properties. Natural gas has been stored successfully in porous media gas reservoirs for over 70 years, and this experience has resulted in the development of a distinct and practical technology for their examination and manipulation which is directly applicable to CAES. Although natural gas can be found in almost all sediments, only when it becomes trapped in a reservoir is the occurrence important for exploitation and later, storage purposes. A gas reservoir is described as that defined portion of a rock formation capable of retaining and transmitting the flow of gas. It should be noted that aquifer structures which prove to be successful storage receptacles are reservoirs. The differences is in the fact that naturally-occurring gas reservoirs have existed as such for geologic time, while aquifer storage reservoirs are essentially man-made versions of the same thing. There can be important differences as well, which are discussed.

47556 (EPRI-AP—5301, pp 5.75-5.79) **CAES Turbomachinery observations.** Nakhamkin, M. Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

Studies on the use of turbomachinery in compressed air energy storage (CAES) development are outlined. The topic is discussed under the following topics: (1) specifics of depleted reservoirs vs. salt dome (pressure flow pattern) and the advantages of turbomachinery.

47557 (EPRI-AP—5301, pp 6.1-6.19) **Development cost and schedule experience.** Whims, M.J. Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

The construction trends in the natural gas storage industry are outlined. A conceptualized cost estimate for a compressed air energy storage (CAES) reservoir (8-well design) is presented.

47558 (EPRI-AP—5301, pp 6.21-6.51) **Field test of compressed air energy storage within an aquifer at Pittsfield, Illinois.** Istvan, J.; Pereira, J. (PB-KBB, Inc.). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

Results of the preliminary design studies co-sponsored by the Department of Energy (DOE) and the Electric Power Research Institute (EPRI) indicate that compressed air energy storage (CAES) is a technically feasible and economically competitive form of generating peaking power. The work performed and data gathered at the CAES test facility in Pittsfield, Illinois from January 1981 to December 1985 are presented. Some of the highlights of locating, characterizing, testing, designing, and operating the facility as well as a summary of data obtained and the conclusions from the field experiment are described.

47559 (EPRI-AP—5301, pp 6.53-6.88) **Assessment of oxygen depletion by inorganic constituents at the Pittsfield, Illinois compressed air energy storage site.** Krapac, I.G.; Griffin, R.S.; Dickerson, D.R. (Illinois State Geological Survey). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

The use of geologic formations to contain air under pressure for later use by the electrical generation industries, is under study at the Pittsfield Compressed Air Energy Storage facility (CAES) by the Electric Power Research Institute and PB-KBB Inc. A potential problem encountered during this pilot study, was the depletion of oxygen from the injected air while the air mass was stored in the formation. Initial injection air composition results indicated that extended periods (3-6 month) of storage in the formation were required before significant oxygen loss could be detected. PB-KBB

Inc. concluded that air situated near the injection well air cycling region would unlikely be affected because of its relatively short residence time in the formation. It has been suggested that oxygen depletion was caused by reactions involving organic material and/or minerals and interstitial fluids within the injection formation. Analyses of core samples collected during July, 1985 indicated the carbon content of the samples was less than 0.1%, suggesting the role of organic material in the oxygen depletion process was minor. It has been concluded that there was little evidence suggesting oxygen depletion was due to microbiological activity based on a study of isotopic carbon signatures of CO_2 gas samples collected from the injection formation, as well as microbial cultures developed in the laboratory. Therefore, this study focused on investigating possible inorganic reactions which may account for oxygen depletion and to quantify the amount of oxygen which could be consumed by the formation.

47560 (EPRI-AP—5301, pp 6.89-6.112) **Evaluation of microbiological depletion of oxygen in the Pittsfield, Illinois CAES site.** Risatti, J.B.; Brower, R.D. (PB-KBB, Inc.). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

The Pittsfield Aquifer Test field in Illinois has been used as a pilot field experiment to demonstrate the feasibility of Compressed Air Energy Storage (CAES) in porous media aquifers. In compressed air energy storage operations, electrical energy is stored by injecting an air bubble into an aquifer during low power needs and then cycling this air through a gas-fired turbine during peak power periods at electrical generation facilities. However, during routine testing it was found that the oxygen content of the compressed air stored in the aquifer had decreased over a period of several months. Air that had been stored in the reservoir for 4-5 months had an oxygen content of 14% and air that had been stored for 9 months had oxygen concentrations as low as 0.3%. In order to determine if the course of the oxygen depletion was due to microbiological activity compressed air samples were collected at time intervals during a five to six hour discharge period and concentrations of carbon dioxide, nitrogen, argon, methane, hydrogen, and oxygen were determined. In addition, stable isotope ratios of carbon dioxide carbon, ($^{12}C/^{13}C$), were measured in samples collected at various periods of discharge from the reservoir and a water sample bailed from well Y-A, was chemically, microbiologically, and mineralogically analyzed. From these data, it was determined that the loss of oxygen in the compressed air in the reservoir was not due to microbiological activity, but was probably due to the oxidation of pyrite present in the aquifer.

47561 (EPRI-AP—5301, pp 7.3-7.10) **ANR Storage Company.** Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

The ANR Company is a subsidiary of the American Natural Resources Company. The activities of the company are discussed. These activities consist of the storage and distribution of natural gas, refining, marketing, and distribution of petroleum products, coal preparation, and compressed air energy storage studies.

47562 (EPRI-AP—5301, pp 7.11-7.23) **Issues requiring resolution for CAES in porous media.** Whims, M.J. (ANR Storage Co.). Jul 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920526. (CONF-8609314—).

From Geotechnology workshop on compressed-air energy storage in porous media sites; Traverse City, MI, USA (23 Sep 1986).

The problems requiring resolution before compressed air energy storage (CAES) can become feasible are discussed. These issues include air/gas flammability, oxygen depletion and changes in sandstones.

2506 Thermal

REFER ALSO TO CITATION(S) 47323, 47324, 47709

2508 Chemical

REFER ALSO TO CITATION(S) 47313

2509 Batteries

REFER ALSO TO CITATION(S) 47717, 47722, 47723, 47724, 47725, 47726, 47727, 47728, 47729, 47733, 47737, 47738, 47739, 47740, 47758, 47759, 47760, 47761, 47762, 47763, 47764, 47776, 47782, 47789, 48019, 48020, 48021, 48022, 48023, 48275

47563 **(AD-A—182779/9/XAB) Study of bipolar nickel-cadmium batteries as pulsed load filters. Final report, January-November 1985.** Chedister, R.W.; Ulmer, J.M. (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, OH (USA)). Jun 1987. 140p. (AFWAL-TR—87-2051). NTIS, PC A07/MF A01.

Bipolar nickel-cadmium batteries were designed, built, and tested for use as capacitive filter elements for possible pulsed-power applications. Electrodes were made by electrochemically impregnating sintered sides of nickel cell walls. Four-cell batteries were constructed by compressing together the electrodes separated by Teflon seals. A computer controlled test circuit charged and discharged the test batteries at frequencies of 1 to 50 Hertz and at depths-of-discharge of less than one percent. A special test battery was constructed with a removeable cadmium electrode for scanning electron microscope study. Battery energy density, effective capacitance, and efficiency were investigated as a function of current load or depth-of-discharge, cycle-rate, and end-of-discharge voltage. Energy densities of nearly 75 joules per pound were demonstrated. Current loads of up to a 100 C-rate were demonstrated, and an average capacitance of 6 farads was achieved. Cadmium-electrode morphology was photographed and studied as a function of the charge and discharge cycle life and no crystalline anomalies were discovered.

47564 **(N—87-24029) Test results of a 60 volt bipolar nickel-hydrogen battery.** Cataldo, R.L.; Gonzalez-Sanabria, O.; Gahn, R.F.; Manzo, M.A.; Gemeiner, R.P. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1987. 7p. (NASA-TM—89927; E—3631; NAS—1.15:89927; AIAA—87-9262; CONF-870804—37). NTIS, PC A02/MF A01.

From 22. intersociety energy conversion engineering conference; Philadelphia, PA, USA (10 Aug 1987).

In July, 1986, a high-voltage nickel-hydrogen battery was assembled at the NASA Lewis Research Center. This battery incorporated bipolar construction techniques to build a 50-cell stack with approximately 1.0 A-hr capacity (C) and an open-circuit voltage of 65 V. The battery was characterized at both low and high current rates prior to pulsed and nonpulsed discharges. Pulse discharges at 5 and 10 C were performed before placing the battery on over 1400, 40% depth-of-discharge, low-earth-orbit cycles. The successful demonstration of a high-voltage bipolar battery in one containment vessel has advanced the technology to where nickel-hydrogen high-voltage systems can be constructed of several modules instead of hundreds of individual cells.

47565 **(N—87-24838) Effect of component compression on the initial performance of an IPV nickel-hydrogen cell.** Gahn, R.F. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1987. 17p. (NASA-TM—100102; E—3590; NAS—1.15:100102; AIAA—87-9257; CONF-870804—38). NTIS, PC A02/MF A01.

From 22. intersociety energy conversion engineering conference; Philadelphia, PA, USA (10 Aug 1987).

An experimental method was developed for evaluating the effect of component compression on the charge and discharge voltage characteristics of a 3 1/2 in. diameter boiler plate cell. A stand-

ard boiler plate pressure vessel was modified by the addition of a mechanical feedthrough on the bottom of the vessel which permitted different compressions to be applied to the components without disturbing the integrity of the stack. Compression loadings from 0.94 to 27.4 psi were applied by suspending weights from the feedthrough rod. Cell voltages were measured for 0.96-C, 55-min charge and for 1.37-C, 35-min and 2-C, 24-min discharges. An initial change in voltage performance on both charge and discharge as the loading increased was attributed to seating of the components. Subsequent variation of the compression from 2.97 to 27.4 psi caused only minor changes in either the charge or the discharge voltages. Several one month open-circuit voltage stands and 1100 cycles under LEO conditions at the maximum loading have produced no change in performance.

47566 **Materials for the new batteries.** Braithwaite, J.W. (Sandia National Labs., Albuquerque, NM). *Advanced Materials and Processes;* **131**: 67-73(Apr 1987).

The development of rechargeable batteries which are more durable, and have higher energies and longer lifetimes is studied. The use of carbon composite, lithium, and metal electrodes in battery systems is examined. The components of a sodium/sulfur cell are described. Research in the areas of ceramic electrolytes such as the polycrystalline ceramic beta-double-prime alumina used in Na/S cells; polymer electrolytes such as polyethylene-oxide- and polypropylene-oxide-based materials that contain dissolved lithium salts; and lithium inorganic electrolytes is discussed. The fabrication of ion-exchange membrane materials composed of polymers for separators is investigated. Consideration is given to the chromium or molybdenum coating of materials for structural components. 10 references.

47567 **Li(Si)/FeS/sub 2/ thin cell thermal battery development.** Wagner, C.G.; Jacobs, D. (General Electric Co., Neutron Devices Dept., Largo, FL 33540). pp 670-676 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—).

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

The need for development of a special thin cell thermal battery technology to accommodate battery miniaturization was recognized several years ago by the battery development group at the Sandia National Laboratory's Power Sources Development operation. This paper discusses ongoing work at the General Electric Co., Neutron Devices Department in the Power Sources Development Laboratory under the guidance of Sandia, Alburquerque. In particular, this paper gives an overview of special pellet production techniques developed, problems currently being worked on, and examples of application of the techniques to thermal battery manufacture.

47568 **Zinc-bromine battery efficiency.** Klein, M.; Leo, A. (Energy Research Corp., 3 Great Pasture Road, Danbury, CT 06810). pp 1-8 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—).

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

The battery system consists of a bipolar electrode stack which is fed with electrolyte from two (positive and negative) recirculation flow systems. The electrolyte is an aqueous solution of zinc bromide, with supporting salts added to improve electrolyte conductivity. On charge the dissolved zinc bromide is electrolyzed to bromine and metallic zinc. On discharge the two reactants are consumed, producing energy and reforming the zinc bromide salt. The zinc-bromine battery system is a promising candidate for bulk energy storage applications. The low cost and high theoretical voltage of the reactants provide the potential for low cost per unit of stored energy. The use of inert electrode reaction substrates, with complete dissolution of discharge products, makes extended cycle life possible.

47569 **Inorganic electrolyte rechargeable Li/SO/sub 2/ system.** Dey, A.N.; Kvo, H.C.; Foster, D.; Schlaikjer, C.; Kallianidis, M. (DURACELL, INC., Duracell Research Center, Needham, MA 02194). pp 176-184 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—).

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

Duracell, Inc. has developed a lithium rechargeable system which operates at ambient temperature and has a nominal voltage of 3.2 volt. The electrolyte contains liquid sulfur dioxide and LiAlCl/sub 4/ electrolyte salt. The electrolyte has a conductivity of 1 x 10/sup -10/ ohm/sup -1/ cm/sup -1/ at room temperature, which is the highest conductivity known for any ambient temperature non-aqueous electrolyte. The system has a porous carbon cathode. In experimental cells, the system delivered 400 cycles at a 50% depth of discharge at a current density of 2 mA/cm/sup 2/ for the discharge and 1mA/cm/sup 2/ for the charge. Futhermore, all the active chemicals present in the system are inherently reversible, very similar to those of the aqueous systems such as lead acid, with the added advantage that no gaseous product such as H/sub 2/ or O/sub 2/ is generated in this system. This allows the system to be hermetically sealed and to be overcharged almost indefinitely with beneficial effect on the cycle life. As a matter of fact, it is possible to rejuvenate a non-functioning cell by trickle charging over a long period if necessary, very similar to that of a lead-acid cell where electrolysis of H/sub 2/O provides the cell balancing function. Based on the data available on the system to date and the chemistry involved, we believe that this system has the versatility of a lead-acid system while having the high energy density and the shelf-life of the lithium systems. In this paper the authors describe the chemistry and the performance characteristics of the prototype cells.

47570 **An overview of Sandia's storage battery program.** Clark, R.P.; Grothaus, K.R. (Sandia National Labs., Albuquerque, NM 87185). pp 23-30 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—). Contract AC04-76DP00789.

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

The primary mission of Sandia National Laboratories is the design and development of the non-nuclear components and systems for nuclear weapons. To a lesser degree, Sandia is also involved in a variety of other programs; such as, energy projects with the Department of Energy, conventional military projects with the Department of Defense, and nuclear waste management and reactor safety with the Nuclear Regulatory Commission. Over the years, Sandia has evolved a considerable expertise in the areas of specialty primary, reserve, and more recently, secondary battery systems. This paper focusses on the status of the storage or secondary battery programs. These programs are divided into those battery systems being developed for energy applications and those being developed for military applications.

47571 **Test of a 500 kWh lead-acid battery for customer-side-of-the-meter applications.** Radimer, B.M.; Pivec, A.; Hyman, E.A. (Public Service Electric and Gas Co., 80 Park Plaza, Newark, NJ 07101). pp 380-386 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—).

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

The Battery Energy Storage Test (BEST) Facility is jointly funded by the U.S. Department of Energy (DOE), the Electric Power Research Institute (EPRI) and Public Service Electric and Gas Company (PSE and G). It serves technology developers and the utility industry in their mutual desire to commercialize effective new energy technologies. Impartial testing of new energy storage, conversion and end-use systems in a utility environment provides a focus for development of and a means for assessing the acceptability of new technologies. The BEST Facility recently completed a test program for a 500 kWh lead-acid battery energy storage system. The system tested was sized and designed for customer-side-of-the-meter applications. The test program was designed for

commercial technology as defined in the Guidelines for BEST Facility Test Programs. EPRI procured the system tested and acted as the system technology developer for this test program.

47572 **A new technique for improving voltage regulation in Li/FeS/sub 2/ thermal batteries.** Godshall, N.A.; Baldwin, A.R. (Sandia National Labs., Exploratory Batteries Div. 2523, Albuquerque, NM 87185). pp 677-685 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—). Contract AC04-76DP00789.

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

Lithiation of the FeS/sub 2/ cathode materials lowers the voltage of the initial discharge (which is often too high for many applications) and raises the voltage of the battery at the end of discharge (which is often too low due to a second voltage plateau). In the example of the Sandia ten-cell Li(Si)/FeS/sub 2/ long-life thermal battery, lithiating the cathode improves the voltage regulation from 12.8 to 0.5% during the initial 5 minutes of discharge and from 38 to 12% over the entire 60 minute discharge time. Batteries employing the new lithiated cathode material were also subjected to dynamic mechanical environments, both before and during electromechanical discharge. No adverse changes in either the electrical or mechanical properties of these batteries were observed, relative to standard composition batteries.

47573 **High conductivity glass electrolytes for sodium/sulfur batteries.** Bloom, I.; Nelson, P.A.; Roche, M.F. (Argonne National Lab., Chemical Technology Div., 9700 S. Cass Avenue, Argonne, IL 60439). pp 37-43 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—). Contract W-31-109-ENG-38.

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

Sodium-ion-conducting glasses are considered a promising alternative to the ceramic electrolytes. The glass upon which the most development work has been done is a sodium borate glass, which has an ionic resistivity of about 2 x 10/sup 4/ Ω-cm at 300°C. Because of its high resistivity, cells using this borate glass require thousands of hollow glass fibers, each about 80 micrometers outer diameter (15 micrometer wall). In spite of its greater complexity, the cell with the glass electrolyte is of interest because of its potential for lower cost and higher power than the cell with ceramic electrolyte. Recently, silicate glasses of lower resistivity have been proposed for this application. These include: a soda-alumina-silica glass (900 Ω-cm at 300°C), a soda-zirconia-magnesia-silica glass (700 Ω-cm at 300°C), and a soda-zirconia-silica glass (600 Ω-cm at 300°C). These lower resistivity glasses would allow a reduction in the number of tubes per cell from thousands to hundreds, which would simplify cell construction. The goal was to find a glass composition that would have low resistivity (ca. 100 Ω-cm at 300°C) and would be chemically stable in the Na/S cell environment. Based on the literature and earlier experiments, high-soda glasses in the Na/sub 2/O-ZrO/sub 2/-Al/sub 2/O/sub 3/-SiO/sub 2/ system were selected to meet these criteria.

29 ENERGY PLANNING AND POLICY

2901 Energy Analysis And Modeling

47574 **(DOE/EIA—0293(87)) Directory of Energy Information Administration model abstracts.** (USDOE Energy Information Administration, Washington, DC. Office of Statistical Standards). 11 Aug 1987. 82p. NTIS, PC A05/MF A01 - GPO; 1; GPO Dep. File Number DE87013862.

This report contains brief statements from the model managers about each model's title, acronym, purpose, and status, followed by more detailed information on characteristics, uses, and requirements. Sources for additional information are identified. All models "active" through March 1987 are included. The main body of this directory is an alphabetical list of all active EIA models. Appendix A identifies major EIA modeling systems and the models within these systems, and Appendix B identifies active EIA models by type (basic, auxiliary, and developing). A basic model is one designated by the EIA Administrator as being sufficiently important to require sustained support and public scrutiny. An auxiliary model is one designated by the EIA Administrator as being used only occasionally in analyses, and therefore requires minimal levels of documentation. A developing model is one designated by the EIA Administrator as being under development and yet of sufficient interest to require a basic level of documentation at a future date. EIA also leases models developed by proprietary software vendors. Documentation for these "proprietary" models is the responsibility of the companies from which they are leased. EIA has recently leased models from Chase Econometrics, Inc., Data Resources, Inc. (DRI), the Oak Ridge National Laboratory (ORNL), and Wharton Econometric Forecasting Associates (WEFA). Leased models are not abstracted here. The directory is intended for the use of energy and energy-policy analysts in the public and private sectors.

47575 **(NP—7753087) Adaptive capacity of energy systems. Risks of long-range engagements. Method of analysis and results.** Josefsson, T. (Foersvarets Forskningsanstalt, Stockholm (Sweden); Energiforskningsnaemnden, Stockholm (Sweden)). 1985. 324p. (In Swedish). NTIS (US Sales Only), PC A14. File Number DE87753087.

The analysis has been made for separate energy plants by means of a method for sequential decisions which means decision-making in two stages. Parts and components of energy plants are dealt with concerning their availability and length of life. Only the technical and economic aspects are paid regard to. The future consequences of choice between different alternatives are to be elucidated. The concequences are illustrated by means of so called technique exchange diagrams which show how the future decisions will fluctuate e.g. in pace with energy prices. The connection is established in the form of price changes which are necessary to converting the plant before it is completely worn out. Price development is introduced explicitly when evaluating the adaptive capacity. The method has been applied to three examples of calculation, namely existing small houses with water circulating systems, new small houses with air heating and partially electric heaters and finally a large district heating plant, Vaertaverket in Stockholm. (G.B.).

47576 **(NP—7900934) Energy assessment '87: An analysis of New York State's energy future.** (New York Energy Office, Albany (USA). Div. of Policy Analysis and Planning). Aug 1987. 90p. Charles R. Guinn, New York State Energy Office, Empire State Plaza, Albany, NY 12223-0001. File Number TI87900934.

This report presents an updated assessment of the State's energy future, including: a forecast of State energy requirements for all fuels, including electric energy and peak demand; an assessment of energy supplies available to meet the forecasted requirements, including petroleum products, natural gas and electricity supplies, as well as conservation and small power; and an identification of the policy implications of the demand forecasts and supply assessments. In order to assure timely decisions with respect to the State's energy future, the report highlights the need to put in place as quickly as possible an integrated energy resource planning process and also to reform the regulatory framework for investments in new electricity generation capacity. Accompanying the report are detailed technical assessment reports on the demand forecasts as well as the petroleum natural gas and electricity supply assessments. A subsequent report, scheduled for release this Fall, will provide an analysis of the implications of various combinations of specific electricity resource measures designed to address the findings of the electricity supply assessment.

47577 **(NP—7900938) New York State energy demand forecasts '87: Technical report.** (New York Energy Office, Albany (USA). Div. of Policy Analysis and Planning). Aug 1987. 117p. Charles R. Guinn, New York State Energy Office, Agency Building No. 2, Empire State Plaza, Albany, NY 12223-0001. File Number TI87900938.

This report represents an updated set of Energy Office long-range energy demand forecasts for New York State which account for recent developments with respect to world oil price, economic activity and efficiency improvements through mid-1986. The

summer peak load forecast presented in this report is based on an assumption of normal peak day weather conditions. The demand forecasts include Statewide energy needs by sector, end-use and fuel type, as well as electric energy requirements and peak demand by utility service area. The demand forecasts provide for a sustained growth economy with improved energy efficiency and cost-effective conservation. The energy demand forecasting framework considers, in a systematic manner, the interrelationships of economic activity, fuel prices, national and State energy policies, fuel substitution, conservation and renewable resources, as well as the availability of conventional fuels. The forecasts reflect conservation effects resulting from mandated efficiency standards and State conservation programs now underway.

2902 Economics And Sociology

REFER ALSO TO CITATION(S) 47064, 47105, 47421, 47453, 47589, 47596, 47665

47578 **(BFR-R—63-1986) Technology assessment in the energy sector. A socio-economic guide.** Andersson, R. (Swedish Council for Building Research, Stockholm). 1986. 112p. (In Swedish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753086.

This report includes a draft guide to the assessment of R and D projects in socioeconomic terms. The guide recommends the award of grants to projects where the anticipated socio-economic value of positive effects exceeds the total project cost. The report pays particular attention to the fact that R and D projects are outstandingly uncertain investments. In cases where there is no point in undertaking strict economic calculations, a number of general guidelines are proposed for the assessments of new technology. A case study of solar heating storage is also included. With 45 refs.

47579 **(KTM/E-B—64) Effects of energy tax reforms on the production process.** Toermae, H.; Loukola, A. (Kauppaja Teollisuusministerio, Helsinki (Finland). Energiaosasto). Jan 1987. 64p. (In Finnish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753325.

The purpose of the present study has been to analyse, with the help of an econometric simulation model, the effects of two energy tax tax reforms with regard to their impacts on the industrial demand for capital, labour, fuels, raw-materials and on the demand for electricity as an input to the production prosess. The analysis was carried out using the generalized Leontief-model, which was estimated using time-series data from the years 1960-1983 on finnish manufacturing. The two energy tax reforms considered were the resent value added tax reform on energy implemented in 1986 and the environmental energy tax alternative in which one should pay an excess tax on those fuels that contain a lot of sulphur. Both taxes were compared to the former production tax system. The allocational effect of these taxes were analysed with scenarios done for the period 1986-1990. If only the substitution effects are considered, then the energy value added tax reform seem to reduse the labour and raw-material intensivenes of the production. According to the results these taxes have nearly at all an effect on the capital intensivenes, but the energy intensivenes of the production will increase. The excess tax on sulphur fuels seems to affect the industrial input demand much the same way as the value added tax. The main difference lays in the absolute amount of the input demand changes, which are lower in the latter tax reform. Both tax alternatives mean that the energy intensivenes of the production will increase. The energy value added tax reform would increase the energy intensiveness of manufacturing on the avarage 1.8% in the period 1986-1990 and the increase would be 0.4% in the environmental tax alternative. Both taxes lower, however, the average production costs of manufacturing. This would amounth to 2.4% in the value added alternative and to 0.6% in the environmental tax reform.

2903 Environment, Health, And Safety

REFER ALSO TO CITATION(S) 47064, 47117, 47135, 47278, 47291, 47450, 47472, 47483, 47484, 47485, 47486, 47487, 47488, 47489, 47490, 47491, 47492, 47493, 47494, 47495, 47496, 47497, 47498, 47499, 47500, 47501, 47502, 47503, 47504, 47505, 47506, 47507, 47508, 47509, 47510, 47511, 47512, 47513, 47514, 47515, 47516, 47517, 47518, 47519, 47520, 47521, 47522, 47523, 47524, 47525, 47526, 47527, 47528, 47529, 47530, 47531, 47532, 47588, 47594, 47595, 47604, 47608, 47707, 48320, 48326, 48364, 48384, 48391, 48399, 48400, 48412, 48413, 48414, 48415, 48416, 48417, 48418, 48433, 48444, 48445, 48446, 48447, 48448, 48449, 48450

47580 **(AD-A—182220/4/XAB) Environmental impact statement: small intercontinental ballistic missile program, Malmstrom Air Force Base, Montana. Draft report.** (Air Force Ballistic Missile Office, Norton AFB, CA (USA)). Jun 1987. 761p. NTIS, PC A99/MF E04.

The Air Force proposes to deploy 200 Small ICBMs within the 341st Strategic Missile Wing at Malmstrom AFB Montana beginning in 1992. The missiles would be carried and protected by special vehicles called Hard Mobile Launchers (HMLs). The HMLs would be deployed within expanded fenced areas that surround existing Minuteman launch facilities. Currently, 200 launch facilities, located throughout an 8,5000-square-mile (sq mi) area in north-central Montana, are supported by Malmstrom AFB. Some HMLs would also be located at Malmstrom AFB for training, maintenance, and repair purposes. Land would be acquired adjacent to existing launch facilities to accommodate expansions, and adjacent to the base to accommodate new military family housing and a HML vehicle operations training area. Existing explosive safety restrictive easements surrounding launch facilities would be expanded. To facilitate transporation fo HMLs to and from deployment sites, the road system (including bridges and culverts) used for the Minuteman program may be improved where necessary to enhance vehicle clearance and weight-bearing capability.

47581 **(NUREG/CR—4958) Impact of proposed financial assurance requirements on nuclear materials licensees.** Hendrickson, P.L.; Scott, M.J.; Mullen, M.F.; Nicholls, A.K.; Smith, S.A. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1987. Contract AC06-76RL01830. 135p. (PNL—6233). NTIS, PC A07/MF A01 - GPO. File Number DE87014897.

The NRC is considering a possible rulemaking that would require certain nuclear materials licensees to demonstrate financial ability to clean up accidental releases of radioactive materials. The rulemaking would potentially affect approximately 16,350 NRC and Agreement State licensees. This report was prepared for NRC by the Pacific Northwest Laboratory to provide background information and analysis for the potential rulemaking. Specific topics examined in the report include: (1) characteristics of potentially affected licensees, (2) the availability and cost of various financial assurance mechanisms, (3) the financial impacts for licensees (including licensees classified as small businesses) of providing $2M of assurance per licensee and a sliding amount of assurance tied to risk, (4) the cost of administering a financial assurance rule, and (5) overall benefits and costs. Tabular information on past material licensee accidents and cleanup efforts is also included. The financial occurrence mechanism that appears to be most suitable for providing the desired financial assurance is one or more newly formed captive insurance companies. Potential benefits of the rulemaking include reduced need for taxpayer-funded cleanup of accidental releases, reduces administrative time to secure such funds, and the possibility of more cleanup with correspondingly reduced occupational and public exposure to radioactive materials.

47582 **(ORNL—6344) Preliminary long-range environmental management plan: Program overview and summary.** Berry, J.B.; Hill, L.G.; Hollenbeck, P.E.; McNeese, L.E.; Myrick, T.E.; Pudelek, R.E.; Rohwer, P.S.; Smith, J.H.; Yook, H.R.; Youngblood, E.L. (Oak Ridge National Lab., TN (USA)). Jul 1987. Contract AC05-84OR21400. 58p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014884.

To provide effective management of the extensive environmental restoration, facilities upgrade, and other environmental activities to be conducted over the next several years, comprehensive

long-range planning is essential. Strategies have been developed that (1) outline the scope of needed improvements; (2) identify specific projects that must be implemented; (3) determine the priorities of these projects based on regulatory compliance, health and safety concerns, schedule and budget constraints, and other programmatic considerations; and (4) develop overall cost and schedule estimates for use in budget requests to DOE. A comprehensive management structure has been adopted for use in planning for environmental restoration and facilities upgrade activities. It consists of seven major program categories: Comprehensive Environmental Management Program, Air Pollution Control Program, Water Pollution Control Program, Solid Waste Management Program, Remedial Action Program, Environmental Monitoring Program, and Research and Development Program. The plan provides a program overview and summary information, focusing on relevant regulatory requirements for each of the seven major program areas, development of overall strategy, and scoping of program costs and schedules.

47583 **(ORNL—6405/R2) Environmental regulatory update table, July 1987.** Brown, K.J.; Langston, M.E.; Tucker, C.S.; Reed, R.M. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 105p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE87014957.

The Environmental Regulatory Update Table provides information on regulatory initiatives of interest to DOE operations and contractor staff with environmental management responsibilities. The table is updated each month with information from the Federal Register and other sources, including direct contact with regulatory agencies. Each table entry provides a chronological record of the rulemaking process for that initiative with an abstract and a projection of further action.

47584 **(PB—87-208062/XAB) From pollution to prevention: a progress report on waste reduction. Special report.** (Office of Technology Assessment (U.S. Congress), Washington, DC). Jun 1987. 64p. (OTA-ITE—347). NTIS, PC A04/MF A01.

Library of Congress catalog card no. 87-619838.

Public interest in protecting health and environment by preventing the generation of hazardous wastes and environmental pollutants is rising. Some companies are discovering that prevention is easier than they thought and that its economic benefits come quickly. Results from an innovative 2-year waste reduction program in Ventura County, California, show how government can assist industry to reduce waste generation and demonstrate that success in waste reduction is possible without traditional, prescriptive regulations. The Subcommittee on Environment, Energy, and Natural Resources of the House Committee on Government Operations requested this special report to bring into focus congressional policy options on reducing the generation of all hazardous wastes and environmental pollutants. The report examines the effectiveness of the limited Federal actions taken so far and summarizes what industry and State and local governments have done to implement waste reduction.

47585 **(PB—87-215349/XAB) Study of joint use of vehicles for transportation of hazardous and nonhazardous materials. A report to Congress.** (Environmental Protection Agency, Washington, DC (USA). Office of Solid Waste and Emergency Response). Apr 1987. 116p. (EPA—540/1-87/001). NTIS, PC A06/MF A01.

The study includes both trucks and rail cars, and includes all potential hazardous materials, substances, and wastes. The EPA identified only a small number of joint-use contamination incidents reported over a 30-year period in the United States, and determined that the existing regulatory and nonregulatory incentives to minimize or avoid contamination were sufficient so that it appears inappropriate at this time to recommend a complete prohibition of the joint use of vehicles. The Agency also is not recommending at this time any further study of the joint-use issue. The Agency believes that further study will not alter the fundamental conclusion of this report that joint use of vehicles to transport hazardous and nonhazardous materials is not a significant problem.

47586 **(UCID—21153) Proposed societal framework for approaching and addressing the issues raised by the increasing emissions and concentrations of radiatively and chemically active gases: A step toward achieving a stable co-existence with the environment.** MacCracken, M.C. (Lawrence Livermore National Lab., CA (USA)). 21 Aug 1987. Contract W-7405-ENG-48. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014614.

The statement is intended as a step in developing a framework for organizing the societal response to the significant environmental perturbations posed in the future by continuing increases in the emissions and atmospheric concentrations of CO_2 and trace gases. A series of initial steps are identified, although the detailed implementation is not addressed. Some aspects of the identified actions proposed are already underway, sponsored variously by national and international agencies, and public and private organizations, including many industrial concerns and professional societies. This document attempts to organize and provide an encompassing perspective for these efforts so that implementation can be coordinated and, as is the case for many of the areas, enhanced efforts can be encouraged.

47587 **Cost of compensating asbestos victims under the Occupational Disease Compensation Act of 1983.** Siskind, F.B. (Dept. of Labor, Washington, DC). *Risk Analysis;* 7: No. 1, 59-69(Mar 1987).

The potentially huge financial liability due to asbestos product suits and the resulting filings for reorganization in bankruptcy by Manville, UNR Industries, Inc., and Amatex, has become a major public policy concern. In response to the problem several bills have been introduced in the Congress to provide compensation for asbestos (and other occupational disease) victims. This paper estimates the cost of compensating asbestos victims under the provisions of the Occupational Disease Compensation Act of 1983, introduced by Congressman George Miller. Utilizing fatality projections from studies by Enterline, Selikoff, and Walker, and assumptions regarding likely claims filing and success rates, duration and degree of disability, medical expenses, first year costs for this legislation are estimated to range from a low of $131 million to a high of $1.9 billion. Present value cost estimates at a 2% real discount rate range from $3 billion to $56 billion. The paper also estimates the impact of possible modifications to the compensation provisions of the legislation. Reducing medical payments by the amount received from medicare would lower costs by 3-4%. Providing survivors with a 3-year lump sum benefit rather than a 5-year lump sum payment would save 20-25% as would offsetting the 5-year lump sum by expected social security old age and disability benefits. Combining all of these changes would reduce costs by almost 50%.

2904 Natural Resources

REFER ALSO TO CITATION(S) 47580, 48433

47588 **(AD-A—182452/3/XAB) Managing underground-storage-tank data using dBASE III plus. Final report.** Donahue, B.A.; Hoctor, T.J.; Piskin, K. (Army Construction Engineering Research Lab., Champaign, IL (USA)). Jun 1987. 47p. (CERL-TR-N—87/21). NTIS, PC A03/MF A01.

The Department of the Army owns approximately 10,000 underground storage tanks (USTs), many of which are old and may be leaking. Under Public Law 94-580, the Resource Conservation and Recovery Act of 1976, Section 9002, installations owning tanks were required to collect and report data on them by May 1986. USA-CERL has created data-based structures, using the dBASE III PLUS software package and microcomputer, which allow this data to be stored, organized, and manipulated. One of the outputs is a Leak Potential Index, to prioritize USTs in order of potential for leakage. This report documents the data bases that were developed. In addition, an appendix provides a short introduction to dBASE III PLUS for the novice user.

47589 **(PB—87-205522/XAB) World nitrogen survey. Technical paper.** Sheldrick, W.F. (International Bank for Reconstruction and Development, Washington, DC (USA). Industry Dept.). 1987. 257p. (WORLD-BANK-TP—59). NTIS MF A01.

Also pub. as International Bank for Reconstruction and Development, Washington, DC. Industry Dept. INDUSTRY AND FINANCE SER-20. See also PB—87-171930; Library of Congress catalog card no. 87-6203; Microfiche copies only. Paper copy available from World Bank, 1818 H St., NW, Washington, DC 20433.

Nitrogen is an important raw material for the chemical and fertilizer industries. Almost all nitrogen products are derived from ammonia, and about 85% go to fertilizer use. The report examines the world nitrogen industry and its outlook through 1995/96. A detailed examination was made of the total costs of producing urea and ammonia and how this is likely to be affected by future energy prices, plant location, and utilization rates. After 1990, it is estimated that at least 10 new nitrogen fertilizer plants will be needed each year through 1995 to meet increasing demand and to replace worn-out plants.

47590 **(PB—87-207122/XAB) Assessment of selected legal/institutional constraints to water conservation in the western states: a summary version.** (Teknekron Research, Inc., Berkeley, CA (USA)). Feb 1983. 27p. NTIS, PC A03/MF A01.

See also PB—87-183158.

This summary document should be of interest to any researchers and policy makers in the water-resource community who have a background in, or are concerned with, agricultural water conservation and the legal/institutional problems associated with conserving western water. There is emphasis in this summary version on the study design, the methodology, the technical findings, and on additional research needs. The document suggests how decision makers can begin to implement the study's recommendations.

47591 **(PB—87-210506/XAB) Understanding paper recycling. Technical paper.** Vogler, J.; Sarjeant, P. (Volunteers in Technical Assistance, Inc., Arlington, VA (USA)). 1986. 23p. (VITA/TP—53:2/86). NTIS, PC PC E03/MF A01.

The report covers fibers and pulps, mechanical pulp, chemical pulps, secondary pulp, coated papers, printed and colored papers, the structure of the paper-making industry, types of waste paper, sources of waste paper, waste paper handling, markets for waste paper, and alternative uses of waste paper such as animal bedding, cartons from old cartons or pulp, building material, asphalted roofing sheets, insulated material, or fuel.

2905 Research, Development, Demonstration, And Commercialization

REFER ALSO TO CITATION(S) 47029, 47056, 47092, 47209, 47574, 48172, 49176

47592 **(LA—11092-MS) A role for national laboratories in enhancing economic competitiveness: The example of high-temperature superconductors: CNSS papers, No. 1.** Hecker, S.S. (Los Alamos National Lab., NM (USA)). Jul 1987. Contract W-7405-ENG-36. 18p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013633.

The basic research community is responding splendidly in pushing the limits of superconductivity. The race to commercialize these new materials is on. The US will face unprecedented international competition, especially from the Japanese. The US needs to develop a partnership among universities, federal laboratories, and private industry. Universities have begun to team with industry while some of the large industrial companies like AT & T and IBM are competing effectively. But it will take more to make the mainstream of US industry competitive. Therefore, an initiative is proposed to develop an industry-DOE national laboratory partnership by establishing Exploratory R & D Centers at these laboratories. The centers will concentrate on the R & D for enabling technologies required to commercialize high-temperature superconductors. This initiative will in part help US industry to be competitive in this new and exciting field.

2906 Nuclear Energy

REFER ALSO TO CITATION(S) 47209, 47428, 47595, 47599, 47604, 48450

47593 **(INIS-mf—10674) Pros and cons of a nuclear phaseout.** Salander, C. (Deutsche Gesellschaft fuer Wiederaufarbeitung von Kernbrennstoffen m.b.H. (DWK), Hannover (Germany, F.R.)). 1987. 12p. (In German). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752623.

A brief description of the development of nuclear energy is followed by a few remarks on the consequences of an immediate nuclear phaseout with particular respect to economic aspects, environmental aspects, the reliable supply aspect and ethical and moral aspects. Part two discusses the consequences of a gradual nuclear phaseout.

47594 **Matrix-based approach to uncertainty and sensitivity analysis for fault trees.** Iman, R.L. (Sandia National Labs., Albuquerque, NM). *Risk Analysis;* **7**: No. 1, 21-33(Mar 1987). Contract AC04-76DP00789.

System unavailabilities for large complex systems such as nuclear power plants are often evaluated through use of fault tree analysis. The system unavailability is obtained from a Boolean representation of a system fault tree. Even after truncation of higher order terms these expressions can be quite large, involving thousands of terms. A general matrix notation is proposed for the representation of Boolean expressions which facilitates uncertainty and sensitivity analysis calculations.

2907 Transport And Storage

REFER ALSO TO CITATION(S) 47305

2910 Conservation

REFER ALSO TO CITATION(S) 47649, 47665, 47667, 47702

2920 Supply, Demand, And Forecasting

REFER ALSO TO CITATION(S) 47115, 47152, 47598, 47600, 47604

2930 Policy, Legislation, And Regulation

REFER ALSO TO CITATION(S) 47135, 47272, 47577, 47578, 47579, 47583, 47598, 47599, 47609, 47707

47595 **(NUREG—1213-Rev.1) Plans and schedules for implementation of US Nuclear Regulatory Commission responsibilities under the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240).** Dunkelman, M.M. (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Low-Level Waste Management and Decommissioning). Aug 1987. 98p. NTIS, PC A05/MF A01 - GPO. File Number DE87900970.

This document makes available the plans and schedules for the US Nuclear Regulatory Commission's (NRC's) implementation of its responsibilities under the Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPAA). The present document identifies the provisions of the LLRWPAA that affect the programs of the NRC, identifies what the NRC must do to fulfill each of its requirements under the LLRWPAA, and establishes schedules for carrying out these requirements.

47596 **Energy unbound: A fable for America's future.** Lovins, A.B.; Lovins, L.H. San Francisco, CA; Sierra Club Books (1986). 256p.

In the form of an instructive fable, two energy experts expound their trademark "soft path" energy philosophy, which is based on cost-effective and energy-sufficient technologies, citizen action, and a free-market economy. In the fable, Eunice Anderson, a budget-conscious housewife from Dubuque, Iowa, is appointed

U.S. Secretary of Energy and sets out to apply common sense to energy problems.

2940 Fossil Fuels

REFER ALSO TO CITATION(S) 47029, 47056, 47064, 47068, 47092, 47115, 47121, 47135, 47135, 47149, 47150, 47151, 47152, 47153, 47163, 47187, 47605, 47605, 48320

47597 **(ORNL—6331) Oil imports and the foreign debt of developing African countries.** Trumble, D.A.; Bjornstad, D.J. (Oak Ridge National Lab., TN (USA)). Jul 1987. Contract AC05-84OR21400. 87p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87014962.

This study examines the oil transactions between 1971 and 1983 of African nations supported by the Agency for International Development, with the objective of estimating the proportion of current indebtedness attributable to crude oil price increases. A data base was constructed, drawing on information from several data series of the International Monetary Fund, the World Bank, and the United Nations. These data were examined using a series of alternative formulas that controlled for particular characteristics of nations with and without oil refineries and controlled, to some degree, for data deficiencies. The results indicate that oil price increases have played a prominent role in debt creation, though perhaps a lesser role than some had suggested. Estimates of the share of debt incurred due to oil price increases range from less than one-third to more than two-thirds. The recent decreases in oil prices may relieve some pressures for continued debt accumulation, although a reduction in pressures is likely to occur less slowly than price decreases. The vulnerability of developing countries to oil price increases underlines the attractiveness of development projects that lessen reliance on imported oil and oil products.

47598 **(STEV—1986-3-) Soviet energy.** (Statens Energiverk, Stockholm (Sweden)). 1986. 95p. (CONF-8506356—). Statens Energiverk.

From International seminar on Soviet energy; Soderfors, Sweden (6 Jun 1985).

This study focuses on the Soviet Union's role as one of the leading energy producers. The National Energy Administration arranged a two-day international seminar in June 1985. Several internationally-prominent experts on the Soviet Union's energy situation participated in this seminar. More than 25 participants representing six countries attended. The principal speakers were Marshall I. Goldman, Michael Kaser, Jonathan Stern and Ed. A. Hewett. This study contains chapters on: - Energy policy in the USSR - Energy trade within Comecon - The USSR in the world market - Energy and politics. Each chapter has been abstracted separately.

47599 (STEV—1986-3, pp 13-26) **Background paper: Soviet energy policy.** Dellenbrandt, J.A. (Uppsala University (Sweden)). 1986. Statens Energiverk. (CONF-8506356—).

From International seminar on Soviet energy; Soderfors, Sweden (6 Jun 1985).

Some fundamental elements of the Soviet energy policy are analyzed. The specific areas include: the physical conditions of Soviet energy policy; the role of energy in the Soviet policy toward the COMECON countries and toward the Western markets; the role of energy in Soviet foreign policy; the problem of dependence on Soviet energy from the West's point of view. The main focus of the paper is on the Soviet Union although some comparisons are made with the European COMECON countries, i.e. the GDR, Poland, the CSSR, Hungary, Romania and Bulgaria. Furthermore, the main focus is on problems concerning energy production from fossil fuel and hydrocarbons, but water power and nuclear power are also considered. The paper is devoted to the policy aspects of Soviet energy, rather than to technical problems.

47600 **Business of coal.** Harrington, R.E. (Dept. of Energy, Washington, DC). pp 9 of Alternate energy '86: worldwide trends and prospects in synthetic fuels and clean coal technologies - conference papers. Washington, DC; Council on Alternate Fuels (1986). (CONF-8605295—).

From Alternate energy '86 conference; Captiva Island, FL, USA (18 May 1986).

This paper discusses the future of energy supplies and the importance of coal in the power generation industry. It covers all aspects of fossil fuels and renewable energy resources into the next century, with a discussion of likely trends in fuel substitution and conservation.

2960 Electric Power

REFER ALSO TO CITATION(S) 47272, 47354, 47600, 47622, 47623, 47624, 47625

47601 **(AD-A—182682/5/XAB) Peak-power cost-reduction guidebook. Final report, May 1983-December 1985.** Selcuk, M.K.; Edmiston, W.A. (Jet Propulsion Lab., Pasadena, CA (USA)). Dec 1985. 121p. NTIS, PC A06/MF A01.

This guidebook was developed to assist Air Force base civil-engineering staffs in evaluating alternative methods for reducing electric-utility costs at the base. The guidebook uses a series of worksheets that are designed to evaluate the electricity-consumption patterns at the base, determine the potential cost savings due to peak shaving, and evaluate alternative methods for achieving cost savings. Most Air Force bases are major daytime users of electric power, with very high on-peak electric power demands. Electric utilities charge their customers not only for the amount of electric energy consumed, measured in kilowatt-hours , but also for the peak power demanded, measured in kilowatts. Each utility has its own policy for determining the rates to charge its customers, but the cost of on-peak power is high and increasing. Consequently, there is a potential for dollar savings if the peak power demanded from the utility can be reduced by changing or shifting consumption patterns. This is often referred to as peak shaving. Most electric utilities define different types of rate structures for different types of customers, summarized in the form or rate schedules, that take into account both the quantity of electricity purchased and the peak demand, as well as the time of day the electricity is demanded. This is especially true of sales to industrial customers, such as Air Force bases. Thus, by finding ways to reduce the peak power demand from the utility, an Air Force base may be able to achieve dollar savings.

47602 **(DOE/EIA—0226(87/06)) Electric power monthly, June 1987.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). 8 Sep 1987. 44p. NTIS, PC A03/MF A01 - GPO; 1; GPO Dep. File Number DE87014991.

In June 1987, temperatures for most of the nation were warmer than normal and warmer than in June 1986. Because of the higher temperatures, total customer demand for electricity in June 1987 was 10,468 gigawatthours higher (5%) than in June 1986. Total net generation in June 1987 reached 225,483 gigawatthours. Although demand was higher during this time period, hydroelectric net generation and petroleum-fired net generation were lower. To compensate for these lower levels, electric utilities generated more electricity from gas- and coal-fired units. Nuclear-powered net generation was also higher in June 1987 than in June 1986. 27 tabs.

47603 **(DOE/EIA—0348(86)) Electric power annual, 1986.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). 17 Sep 1987. 169p. NTIS, PC A08/MF A01 - GPO; 1; GPO Dep. File Number DE88000279.

Sharply lower petroleum prices in 1986 from 1985 led to increased net generation by petroleum-fired plants and less gas-fired generation. Nuclear-powered generation capability increased in 1986, resulting in increased nuclear-powered net generation. These factors also resulted in less coal-fired net generation. While generation by fuel type shifted, total electricity generation and sales increased only slightly from 1985 to 1986. Residential electricity sales exceeded industrial sales for the first time. In 1986, petroleum-fired net generation reached 136,585 gigawatthours, the highest annual level since 1983. Petroleum-fired net generation increased 36% in 1986 from 1985, but still represented only about 5% of total net generation. As a result of increased petroleum-fired net generation, gas-fired net generation and gas consumption decreased in 1986

compared with 1985. Electricity produced from gas was 248,508 gigawatthours in 1986, decreasing 15% from 1985. Coal-fired net generation and coal consumption decreased in 1986 compared with 1985, mainly because nuclear-powered net generation increased. Net generation from coal in 1986 was 1,385,831 gigawatthours, down 1% during the year. Nuclear powered net generation reached 414,038 gigawatthours in 1986, an increase of 8% over the 1985 level. Uranium was the second most important energy source in the generation of electricity, producing 17% of total net generation. New units contributing to shifts in generation shares during 1986 included 5 nuclear-powered units with a net summer capability of 5,803 megawatts and 10 coal-fired units with a net summer capability of 4,868 megawatts. Additionally, 21 petroleum-fired, 8 gas-fired, and 43 hydroelectric units, with a combined net summer capability of 377 megawatts, became operable during 1986. The gas- and petroleum-fired units were combustion turbines and internal combustion engines. One solar unit also became operable in 1986. 10 refs., 20 figs., 48 tabs.

47604 **(DOE/EIA—0436(87)) World nuclear fuel cycle requirements, 1987.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). 27 Aug 1987. 99p. NTIS, PC A05/MF A01 - GPO; 1; GPO Dep. File Number DE87014538.

Projected requirements for uranium concentrate and uranium enrichment services to fuel the nuclear power plants expected to be operating under three nuclear supply scenarios (the Lower Reference, Upper Reference, and Optimistic cases) in the United States, Canada, Europe, the Far East, and other countries in the World Outside Centrally Planned Economic Areas are analyzed. The report also presents projections of spent nuclear fuel discharges and inventories of spent fuel. Domestic projections are provided through the year 2020 and include a No New Orders case. Annual spent fuel projections for the No New Orders case as extended to 2040 are presented in Appendix E. Foreign projections are provided through 2010. The report also contains an analysis of the sensitivities of the nuclear fuel cycle projections to different levels and types of projected nuclear capacity, different enrichment tails assays, higher and lower capacity factors, and changes in nuclear fuel burnup levels.

47605 **(EPRI-EM—5356) Models of commercial sector equipment and fuel decisions for the COMMEND code: Framework design and data development plan: Final report.** McMenamin, J.S.; Train, K. (Regional Economic Research, San Diego, CA (USA); Cambridge Systematics, Inc., Berkeley, CA (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Aug 1987. 41p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920571.

The body of this report has three sections. Section 2 contains a brief description of the technology choice issue and summarizes modeling approaches that are currently in use. Section 3 presents the empirical framework. Finally, section 4 contains a discussion of the data development strategy. References are listed in section 5.

47606 **(PB—87-217444/XAB) Survey of electric utility ratebooks in 120 cities, 1984. Topical report.** Clayton, M.; Schoening, N. (Alabama Univ., Huntsville (USA). Center for High Technology Management and Economic Research). Jan 1985. 283p. NTIS, PC A13/MF A01.

This report provides a summary of the types of electric rates that were available in 120 U.S. cities during the summer of 1984. Data came from ratebooks in effect at that time and the information they contained was verified by phone interview with utility personnel. However, changes may have occurred between the time of the survey and the time of printing. A summary of the findings appears at the front of the report along with a number of tables highlighting various rate characteristics and their geographical dispersion across the country. The remainder of the report is made up of individual tables reporting the results for each city in the sample.

47607 **(PB—87-222691/XAB) General-service electric and gas rates for the residential and commercial sectors: 1986. Topical report.** Schoening, N.C.; Clayton, M.D. (Alabama Univ., Huntsville (USA). Center for High Technology Management and Economic Research). Mar 1987. 296p. (UAH-RR—579). NTIS, PC A13/MF A01.

To perform evaluations of gas-fueled and competing technologies in the residential and commercial sectors, complete and accurate information on fuel prices is necessary. A data base report is provided on electric and gas rates for 43 U.S. locations in the winter and summer of 1986. The rates include usage charges, demand charges, fuel-cost adjustments, taxes, and surcharges. The data represent general service rates in effect as of January 1 and June 1, 1986, which have 5% or more of the customer class on them. The construction of this data base satisfies both the immediate need of fuel prices to compute operating costs and the longer-term requirement of the analysis of the rate structures for characteristics and trends. This data base will find many applications by the energy-analyst community.

2980 Consumption And Utilization

REFER ALSO TO CITATION(S) 47151, 47577, 47706

2990 Unconventional Sources And Power Generation

REFER ALSO TO CITATION(S) 47271, 47272, 47599, 47600

47608 **(ANL/CNSV-TM—173) Energy from municipal waste: opportunities for the Southwest.** Brooks, C. (comp.). (Argonne National Lab., IL (USA)). May 1987. Contract W-31109-ENG-38. 229p. (CONF-8606334—). NTIS, PC A11/MF A01; 1; GPO Dep. File Number DE87014258.

From Workshop on energy from municipal waste: opportunities for the Southwest; Austin, TX, USA (23 Jun 1986).

This report focuses on the recovery of energy and usable materials from municipal waste in an environmentally acceptable manner, with special emphasis on issues of particular relevance to cities and industries in the American Southwest. Local and national authorities on the various aspects of resource recovery - as well as on finance, marketing, and environmental concerns - presented information at a workshop held June 23 to 25, 1986, in Austin, Texas. Plant operators and project managers shared insights gained from hands-on experience. Environmental concerns and the regulations of the US Environmental Protection Agency and state environmental agencies were also addressed.

47609 **(CONF-871089—1) Fifty years in synthetic fuels information: Have we lost a strategic national resource?.** Roseberry, L.M. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 13p. NTIS, PC A02/MF A01; GPO Dep. File Number DE87010902.

From American Society for Information Science's annual meeting; Boston, MA, USA (4 Oct 1987).

The recent 50-year history of the synthetic fuels industry is a long saga of fluctuating national interest, funding, and precipitous world events. The goal of a unified information set has been seriously compromised by war and shortages, prosperity and apathy, economic conflict and OPEC, and a return to abundant supply. On the horizon looms the dismal prospect of a real and permanent energy shortage, a prospect that easily justifies the need for keeping important technical information for the future. This paper tells the tale of the research literature from the German experience during World War II through the disbanding of the Synthetic Fuels Corporation.

30 DIRECT ENERGY CONVERSION

3001 Mhd Generators

47610 **(DOE/ET/10815—121) [The MHD [magnetohydrodynamics] coal fired flow facility]: Quarterly technical progress report, April-June 1987.** (Tennessee Univ., Tullahoma (USA). Space Inst.). Sep 1987. Contract AC02-79ET10815. 24p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000178.

In this Quarterly Technical Progress Report, UTSI reports on progress in a multitask program to develop MHD technology, currently oriented toward the steam bottoming plant and environmental considerations. Plans and preparation for resumption of testing in the DOE Coal Fired Flow Facility are summarized. The status of the new aerodynamic duct, nozzle and diffuser is reported. Plans for continued testing of tubes made of candidate materials in the superheater test module are discussed. Progress in preparing the facility for the upcoming tests are included. Plans formulated jointly with Mississippi State University for application of advanced instrumentation in future tests are detailed. Additional analyses of data from previous tests is included in particulate loading and size distribution, seed recovery and trace elements. Progress in the environmental program is reported for the water quality program, the trace element study and process gas analysis.

47611 **(DOE/PC/70507—11) MHD [magnetohydrodynamics] channel development: Quarterly report for October 1986-December 1986.** (Avco Research Lab., Inc., Everett, MA (USA)). Jan 1987. Contract AC22-84PC70507. 139p. NTIS, PC A07/MF A01; 1; GPO Dep. File Number DE87014126.

Both Faraday and diagonal loaded MHD generators have larger power outputs at high wall temperatures for all generator sizes investigated. The increase in power at high T/sub w/ diminishes with generator scale due to the drop in heat losses per unit volume as channels scale up. Boundary layer electrical detriments are volumetric effects and thus don't look too different when scaled to larger MHD generators. Voltage drops and axial shorting effects dominate at low wall temperature while velocity defects become important at high wall temperature. An experiment to investigate the effects of cathode resegmentation on the performance of an MHD generator controlled the cathode resegmentation effect by using externally shorted cathodes and by minimizing internal shorting by eliminating the ash injection. The data obtained from this experiment provide insights into the current flow within the shorted regions. The data also provides a qualitative understanding of the effect of cathode resegmentation on the internal electric fields and current densities. Review of the 86-SEED-6 test results indicates that a significant portion of the 1A channel power shortfall is associated with loss of Hall voltage. The Hall voltage loss may be coupled to axial current leakage in the slag layer as demonstrated during the post-power conductivity measurement test. The results of oil-fired and the coal-fired generator tests from the CDIF are compared. The axial leakage effects are much more dominant in the coal-fired tests. The shortfall in the performance of the coal-fired generator tests is the result of the increased leakage. Attempts are being made to identify and alleviate the various possible causes of this leakage. 15 refs., 78 figs.

47612 **(STDR—86-24) Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.** Demetriades, S.T.; Maxwell, C.D. (STD Research Corp., Arcadia, CA (USA)). Aug 1986. Contract AC22-83PC60576. 277p. NTIS, PC A13/MF A01; 1; GPO Dep. File Number DE87011982.

Multidemensional and time dependent computer simulations revealed crucial, and in some cases, previously unsuspected phenomena that govern MHD system performance. These include a class of phenomena known as magnetoaerothermal effects which occur in high performance MHD generators with strong interaction between the magnetic forces and the flowfield. The predicted existence and importance of these phenomena were dramatically confirmed by the MHD High Performance Demonstration Experiment at the Arnold Engineering Development Center in 1982. Pre- and post-test simulations of this experiment and subsequent experiments at Avco Everett Research Laboratory and Stanford University validated the models which predicted these effects. To investigate the magnitude of these and other phenomena on the performance of prototype- and full-scale MHD generators, and to find ways of mitigating their harmful effects, the validated models were applied to generator designs for the Engineering Test Facility and Advanced Power Train projects and to the Proof-of-Concept testing at the Component Development and Integration Facility in Butte, Montana. A simple criterion for assessing the possible importance of magnetoaerothermal effects was devised and applied successfully to a variety of generator designs. Eight appendices have been entered separately into EDB and ERA. 56 refs., 65 figs., 1 tab.

47613 (STDR—86-24, pp A.1-A.14, Appendix A) **On the magnetoaerothermal instability.** Demetriades, S.T.; Oliver, D.A.; Swean, T.F. Jr.; Maxwell, C.D. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

A fundamental instability in MHD channel flow, hitherto unknown or unappreciated, is described. Lorentz force-driven secondary flow cells preferentially couple core temperature gradient modes into the near fields of the anode wall leading to a locally growing Lorentz force which eventually separates the anode boundary layer. The instability is described with both heuristic order-of-magnitude analyses and detailed three-dimensional, turbulent, MHD flow computations. This magnetoaerothermal instability will be manifested in commercial scale MHD generators of moderate MHD interaction parameter. Methods of control and prevention of the magnetoaerothermal instability exist. 18 refs., 9 figs., 1 tab.

47614 (STDR—86-24, pp B.1-B.16, Appendix B) **The STD/MHD [magnetohydrodynamics] codes: Comparison of analyses with experiments at AEDC/HPDE, [Arnold Engineering Development Center/High Performance Demonstration Experiment], Reynolds Metal Co., and Hercules, Inc.** Vetter, A.A.; Maxwell, C.D.; Swean, T.F. Jr.; Demetriades, S.T.; Oliver, D.A.; Bangerter, C.D. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

Data from sufficiently well-instrumented, short-duration experiments at AEDC/HPDE, Reynolds Metal Co., and Hercules, Inc., are compared to analyses with multidimensional and time-dependent simulations with the STD/MHD computer codes. These analyses reveal detailed features of major transient events, severe loss mechanisms, and anomalous MHD behavior. In particular, these analyses predicted higher-than-design voltage drops, Hall voltage overshoots, and asymmetric voltage drops before the experimental data were available. The predictions obtained with these analyses are in excellent agreement with the experimental data and the failure predictions are consistent with the experiments. The design of large, high-interaction or advanced MHD experiments will require application of sophisticated, detailed and comprehensive computational procedures in order to account for the critical mechanisms which led to the observed behavior in these experiments. 39 refs., 25 figs.

47615 (STDR—86-24, pp C.1-C.21, Appendix C) **Three-dimensional effects in large-scale MHD [magnetohydrodynamics] generators.** Maxwell, C.D.; Swean, T.F. Jr.; Vetter, A.A.; Crouse, R.D.; Oliver, D.A.; Bangerter, C.D.; Demetriades, S.T. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

The three-dimensional responses of magnetohydrodynamic channel flows to (1) changes in wall temperature, (2) the presence of net axial currents, and (3) the use of unconventional electrode and wall configurations are examined computationally for large-scale, linear, combustion-driven MHD generators of current interest. In the moderate interaction regime studied, high wall tempera-

tures are shown to inhibit the development of the secondary flow-driven magnetoaerothermal instability. The control of the secondary flow pattern by manipulation of the net axial flow of current is discussed. Alternate electrode configurations for improving overall performance and suppressing the magnetoaerothermal instability are considered. The above design trade-offs will be increasingly important as interaction levels exceed those of the contemporary MHD experiments studied in this paper. 19 refs., 14 figs., 3 tabs.

47616 (STDR—86-24, pp D.1-D.21, Appendix D) **Progress in analytical modeling of MHD [magnetohydrodynamics] power generators 2.** Demetriades, S.T.; Maxwell, C.D.; Oliver, D.A. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

A survey is presented of some significant results from the past 11 years of applications of the STD/MHD codes to a wide variety of MHD power generation devices and experiments. Emphasis is placed upon recent applications which have elucidated a number of important processes associated with strong MHD interaction. Among these is the magnetoaerothermal effect, for which very dramatic data have recently become available. These data confirm the earlier predictions of the existence and potential impact of this effect. 31 refs., 12 figs.

47617 (STDR—86-24, pp E.1-E.26, Appendix E) **Consideration of optimal boundary configurations for linear MHD [magnetohydrodynamics] generators.** Maxwell, C.D.; Demetriades, J.T.; Oliver, D.A.; Demetriades, S.T. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

Three dimensional simulations of three linear MHD generators ranging from laboratory to commercial scale are examined to determine the influence of channel boundary and loading configuration upon gasdynamic and electrical performance. The secondary flow caused by the Hall current in diagonally connected generators is shown to produce cold, low speed flow over the anode or the cathode, depending upon the direction of the current. For generators with strong velocity interaction, magnetoaerothermal jets or growths of cold, low speed gas are shown to form over the electrodes. Placement of conductors on the sidewalls is shown to allow the current attachment point to move to avoid the low speed, low conductivity regions of the cross section. MHD-induced secondary flows are shown to exist even in generators with circular cross section. Previous idealized analyses of circular cross section generators are shown to greatly underestimate the optimum electrode surface area. 14 refs., 16 figs., 2 tabs.

47618 (STDR—86-24, pp F.1-F.21, Appendix F) **Predicted strength and influence of MHD [magnetohydrodynamics]-induced secondary flows in recent experiments.** Maxwell, C.D.; Early, D.W.; Demetriades, S.T. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

Secondary flow effects in subscale MHD channels at Avco Everett Research Laboratory and Stanford University are examined by numerical simulation. Secondary flows up to 20% of the mean flow velocity are predicted to be generated in these experiments. It is shown that secondary flow effects can be modulated by control of the strength and direction of the Hall current density that is generated or applied in these experiments. Important secondary flow effects include the projection of jets of cold, low-momentum fluid over the electrode surfaces, and significant heat transfer asymmetries between the anode and cathode walls. Measurements of the heat transfer asymmetry in the Avco Mark VI are presented in an appendix. Such effects are shown to be important also in larger channels such as the CDIF 1A1 and a conceptual design for a 500 MW(th) Advanced Power Train. 19 refs., 25 figs., 1 tab.

47619 (STDR—86-24, pp G.1-G.21, Appendix G) **Devices with strong MHD [magnetohydrodynamics] interaction.** Demetriades, S.T.; Maxwell, C.D. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

To be successful, devices such as the self-excited MHD generator and the MPD thrustor must operate in the strong MHD interaction regime. Plasma flows with strong magnetohydrodynamic (MHD) interaction are examined in numerical simulations of situations of interest to such devices for high performance MHD energy conversion. The importance of flow distortions and nonideal processes associated with strong MHD interaction is well established theoretically and experimentally. Strategies for managing these processes are examined in order to extend present MHD power generator performance levels beyond the 0.6 to 0.7 MJ/kg specific energy extraction demonstrated to date in combustion-driven generators. Strategies for managing these processes that allow speeds above 10^5 m/sec to be reached in accelerators are examined. The role of the plasma boundary configuration in determining the flow development and the likelihood of the development of the magnetoaerothermal instability is discussed. Finally, the importance of high magnetic Reynolds number effects is considered for MHD devices capable of high levels of MHD interaction. 38 refs., 8 figs., 2 tabs.

47620 (STDR—86-24, pp H.1-H.12, Appendix H) **Three-dimensional MHD [magnetohydrodynamics] flow in the CDIF [Component Development and Integration Facility] powertrain.** Demetriades, S.T.; Maxwell, C.D.; Oliver, D.A. Aug 1986. NTIS, PC A13/MF A01. File Number DE87011982.

In Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986.

Initial three-dimensional simulations of feasible operating conditions of the CDIF powertrain are reported. The results of these simulations indicate the presence incipient magnetoaerothermal (MAT) current constriction on the anode centers under some conditions. The current constrictions studied are quenched by the cool boundary layer gas convected by secondary flows. Parametric studies of a generalized MAT stability criterion indicate directions for future experiments in order to induce, isolate and study the MAT current constriction in the CDIF facility. 10 refs., 11 figs.

3005 Fuel Cells

REFER ALSO TO CITATION(S) 47262, 47890

47621 **(PB—87-218152/XAB) Synthesis of novel fluorinated phosphonic and phosphinic acid electrolytes for phosphoric acid fuel cells. Annual report, June 1986-May 1987.** Burton, D.J. (Iowa Univ., Iowa City (USA). Dept. of Chemistry). May 1987. 41p. NTIS, PC A03/MF A01.

See also report for May 1985-Apr 1986, PB—87-222825.

New methodology has been developed for the preparation of halodifluoromethyl phosphonates. Various coupling processes convert the halodifluoromethyl phosphonates to fluorinated bis-phosphonates, which serve as precursors to the fluorinated phosphonic acids. Alternatively, alpha, omega diiodoperfluoroalkanes can be converted to fluorinated bis-phosphites, which can be oxidized to the desired fluorinated bis-phosphonate precursors. The halodifluoromethyl phosphonates were also utilized as precursors to the preparation of mixed fluorinated phosphonic-sulfonic acid derivatives, a previously unknown class of superacid. Alternatively, the halodifluoromethyl phosphonates were employed in the preparation of stable difluoromehtylene phosphonate organometallics, which could be functionalized to yield the fluorinated phosphonic-sulfonic acid derivatives. Complete electrochemical evaluation is in progress.

47622 **(PB—87-221222/XAB) Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project.** (Science Applications International Corp., La Jolla, CA (USA)). Nov 1986. 2897p. NTIS, PC PC E99.

Set includes PB—87-221230 through PB—87-221289.
This is a set of 6 reports, and the Executive Summary and first two reports are included here.

47623 **(PB—87-221230/XAB) Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project. Volume 1. Topical report, 1983-1985.** Racine, W.C.; Campillo, C.J. (Science Applications International Corp., La Jolla, CA (USA)). Nov 1986. 481p. (SAIC—86/1929-VOL-1). NTIS, PC A21/MF A01.

See also Volume 2, PB—87-221248; Also available in set of 6 reports PC E99, PB—87-221222.

During the site selection phase of the Onsite Fuel-Cell Field Test, nearly one hundred sites throughout the U.S. were each instrumented with a standard data-acquisition system (DAS) to collect hourly electrical and thermal data for one year. Seventy of those sites are included in the report. Each site's electrical and thermal systems were instrumented including ambient temperature, electrical demands building gas usage, and other parameters which were necessary to calculate building thermal loads. Multifamily residential, commercial and light industrial sites were instrumented. Approximately twenty market sectors were represented including restaurants, hospitals, hotels, apartments, health clubs, nursing homes, and food-processing plants. The primary use of the data was to determine site compatibility for the installation of 40-kW fuel-cell power plants. However, the collected energy data and site-specific information summarized in the comprehensive report may also be useful for other applications such as market characterization, and simulation of new or improved energy-utilization equipment in actual sites. This volume focuses on apartments, bakeries, bowling alleys, and dormitories.)

47624 **(PB—87-221248/XAB) Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project. Volume 2. Topical report, 1983-1985.** Racine, W.C.; Campillo, C.J. (Science Applications International Corp., La Jolla, CA (USA)). Nov 1986. 684p. (SAIC—86/1929-VOL-2). NTIS, PC A99/MF E04.

See also Volume 1, PB—87-221230, and Volume 3, PB—87-221255; Also available in set of 6 reports PC E99, PB—87-221222.

During the site selection phase of the Onsite Fuel-Cell Field Test, nearly one hundred sites throughout the U.S. were each instrumented with a standard data-acquisition system (DAS) to collect hourly electrical and thermal data for one year. Seventy of those sites are included in the report. Each site's electrical and thermal systems were instrumented including ambient temperature, electrical demands building gas usage, and other parameters which were necessary to calculate building thermal loads. Multifamily residential, commercial and light industrial sites were instrumented. Approximately twenty market sectors were represented including restaurants, hospitals, hotels, apartments, health clubs, nursing homes, and food-processing plants. The primary use of the data was to determine site compatibility for the installation of 40-kW fuel-cell power plants. However, the collected energy data and site-specific information summarized in this comprehensive report may also be useful for other applications such as market characterization, and simulation of new or improved energy-utilization equipment in actual sites. This volume focuses on food processors, groceries, health clubs, and hospitals.

47625 **(PB—87-221289/XAB) Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project. Executive Summary. Topical report, 1983-1985.** Racine, W.C.; Campillo, C.J. (Science Applications International Corp., La Jolla, CA (USA)). Nov 1986. 79p. (SAIC—86/1929-VOL-6). NTIS, PC A05/MF A01.

See also Volume 5, PB—87-221271; Also available in set of 6 reports PC E99, PB—87-221222.

During the site selection phase of the Onsite Fuel-Cell Field Test, nearly one hundred sites throughout the U.S. were each instrumented with a standard data-acquisition system (DAS) to collect hourly electrical and thermal data for one year. Seventy of those sites are included in the report. Each site's electrical and thermal systems were instrumented including ambient temperature, electrical demands building gas usage, and other parameters which were necessary to calculate building thermal loads. Multifamily residential, commercial and light industrial sites were instrumented. Approximately twenty market sectors were represented including restaurants, hospitals, hotels, apartments, health clubs, nursing homes, and food-processing plants. The primary use of the data was to determine site compatibility for the installation of 40 kW fuel cell power plants. However, the collected energy data and site-specific information summarized in the comprehensive report may also be useful for other applications such as market characterization, and simulation of new or improved energy utilization equipment in actual sites.

47626 **(PB—87-221305/XAB) Synthesis of novel acid electrolytes for phosphoric-acid fuel cells. Annual report, May 1986-April 1987.** Adcock, J.L. (Tennessee Univ., Knoxville (USA). Dept. of Chemistry). Jun 1987. 32p. NTIS, PC A03/MF A01.

See also PB—86-233806.

Construction of a 40-mmole-per-hour scale aerosol direct-fluorination reactor was completed June 26, 1986. F-Methyl F-4-methoxybutanoate and F-4-methoxybutanoyl fluoride were synthesized by aerosol direct fluorination of methyl 4-methoxybutanoate. Basic hydrolysis of the perfluorinated derivatives produce sodium F-4-methoxybutanoate which was pyrolyzed to F-3-methoxy-1-propene. F-3-ethoxy-1-propene, F-3,3dimethylbutene, and F-3-(2-methoxyethoxy)-1-propene were prepared in a similar manner. Ten, six, and seven gram samples of the first three compounds were provided to other GRI contractors for synthesis of perfluorinated sulfur (VI) and phosphorous (V) acids.

47627 **(STEV-NYEL—87-4) AFC power plant. Feasibility study.** Boghammar, A.; Wiktorsson, L.P. (Statens Energiverk, Stockholm (Sweden); Royal Inst. of Tech., Stockholm (Sweden). Dept. of Chemical Technology). Mar 1987. 58p. (KTH-KTR—87-12). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753361.

It is concluded that a fuel cell power plant can compete with flue gas desulphuruzation. A computer program has verified the results from the study by calculating the cost performance of the plant. The comparison with a pressurized fuel cell plant gives an advantage for the ordinary AFC plant. (G.B.).

47628 **Fuel cell plates with skewed process channels for uniform distribution of stack compression load.** Granata, S.J. Jr.; Woodle, B.M. (to Dept. of Energy, Washington, DC). US Patent 4,684,582. 4 Aug 1987. Filed date 4 Dec 1985. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

An electrochemical fuel cell is described including an anode electrode, a cathode electrode, an electrolyte matrix sandwiched between the electrodes and a pair of plates above and below the electrodes. The plate above the electrodes has a lower surface with a first group of process gas flow channels formed and the plate below the electrodes has an upper surface with a second group of process gas flow channels. The channels of each group extend generally parallel to one another. The improvement comprises; the process gas flow channels on the lower surface of the plate above the anode electrode and the process gas flow channels on the upper surface of the plate below the cathode electrode are skewed in opposite directions such that contract areas of the surfaces of the plates through the electrodes are formed in crisscross arrangements.

47629 **Field experience with 40 Kw fuel cell power plants at military bases.** Taylor, R.W.; Ferraro, V.D.; Huber, W.J. (Science Applications International Corp., 1200 Prospect Street, La Jolla, CA 92038). pp 629-635 of Proceedings of the 32nd international power sources symposium. Pennington, NJ; The Electrochemical Society (1986). (CONF-860688—).

From 32. NASA/US Army international power sources symposium; Cherry Hill, NJ, USA (8 Jun 1986).

The U.S. Department of Energy (DOE), in cooperation with the Department of Defense (DOD), is sponsoring the field testing of four 40 kW fuel cell power plants at military bases in the United States. The purpose of the project is to gain experience with the operation and performance of fuel cell power plants to demonstrate their viability for military bases. Science Applications International

Corporation (SAIC) is responsible for the power plant design, installation, and performance data collection and analysis. The fuel cell power plants were scheduled to operate for one year at each site providing electricity and heat for space heating, domestic hot water and process heat. A complete data acquisition system (DAS) was installed at each site to monitor the power plants' performance. The installation of 40 kW fuel cells at military bases is a separate, but parallel program to the Gas Research Institute's (GRI) Onsite Fuel Cell Field Test Project. The GRI Field Test Project is composed of field testing over forty 40 kW fuel cell power plants.

3008 Miscellaneous Converters

47630 **(AD-A—182605/6/XAB) Liquid-droplet radiator in space: a parametric approach. Master's thesis.** Buckner, G.L. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Mar 1987. 72p. (AFIT/GNE/ENP—87M-1). NTIS, PC A04/MF A01.

A successful space mission must have a source of electrical power whether the mission is manned, unmanned, scientific, or nationally strategic. The generation of this electric power will require the rejection of waste heat. For example, the Strategic Defense Initiative will have space-based systems generating large amounts of electrical energy with much waste heat energy to be radiated to space. Other space applications requiring from 100 kilowatts to over 100 megawatts include: Space Based Radars, Nuclear/Electric Orbital Transfer Vehicles, Space Based Weapon Systems, and the Space Station. The objective of this study was to investigate the performance and operating characteristics of a cylindrical LDR for use in space by minimizing the mass per heat radiated as a function of the average droplet temperature at the collector using a new pump specific mass term defined as pump mass per liquid mass flow rate.

47631 **Electricity and short wavelength radiation generator.** George, E.V. (to Department of Energy, Washington, DC). British Patent 2179780/A/. 11 Mar 1987. Priority date 26 Aug 1985, United States of America (USA), 10p. Patent Office, 25 Southampton Buildings, London, WC2A 1AY.

US priority 769518.

Neutron radiation n reacts with Li^6 in the wall to produce energetic ions which interact with inert gas to produce a UV emitting plasma. The UV interacts with the wall to produce photo-electrons captured by an anode to produce an electrical output voltage. There may also be an exit for u.V. radiation. In an alternative electrical generator, fusion is induced in a pellet at the centre of a sphere by means of laser radiation, the neutrons emitted induce a UV emitting plasma in an inert gas within the sphere, and the UV either causes emission of photo-electrons at the sphere wall to be collected by an anode adjacent the walls to produce an output voltage, or produces an output voltage by means of photovoltaic arrays adjacent the sphere wall.

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

3201 Buildings

REFER ALSO TO CITATION(S) 47321, 47575, 47702, 47710

47632 **(BFR-R—2-1986) Ground heat technology in group central heating plants in Soedertaelje and Straengnaes. Introduction and obstacle.** Hyden, H. (Swedish Council for Building Research, Stockholm). 1986. 43p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753088.

Various technical solutions have been developed for utilization of ground heat to suit differing geological conditions. Certain techniques have become commercially established for single-family dwellings. Large-scale ground heating facilities require a great deal more effort at the planning and projecting stage in order for good final result to be attained. The market introduction of larger facilities has therefore not proceeded with the same measure of speed and success. The object of the present project has been to study the possibilities for, and obstacles in the way of introduction of ground heat technology in group central heating plants and to call attention to the actions required in order for the technique to be properly observed and exploited. The goal of the project is for the conclusions reached to achieve a basis for the elaboration of such steering means on the part of the authorities that ground technology is developed and introduced to the market, to the extent considered justifiable. In the light of a review of the technical and economic prerequisites for the different techniques the possibilities of an introduction have been studied and discussed together with those responsible for energy and housing management in two local government areas, namely Straengnaes and Soedertaelje.

47633 **(BFR-R—13-1986) Design of surface earth-heat-collector. Calculation with a computer model.** Rehn, I.; Sundberg, J.; Modin, B.O. (Swedish Council for Building Research, Stockholm). 1986. 121p. (In Swedish). NTIS (US Sales Only), PC A06. File Number DE87753089.

A computer model based on the finite difference method has been used to investigate the performance of a surface earth-heat-collector in order to establish design rating rules for it. Although the computer simulations that have been run are intended to cover a large number of design cases of surface earth heating systems, they do not cover all cases. The different geographical sites have been selected, having different types of climates: Luleaa in northern Sweden, Uppsala in central Sweden and Kristianstad in the south of the country. Climatic conditions have simulated a normal year and an extreme year in terms of both air temperature and snow cover. Nine different simplified, homogeneous types of soil have been considered for Luleaa, and five different types for Uppsala and Kristianstad. Depths of pipe burial and distance between loops of pipe in the collector have been varied. Extraction rates have been varied between 16 and 125 kwh (m/sp2/ year), either varying with air temperature or assumed to be base load. The results of the computer runs are shown in over 50 diagrams, from which the minimum, maximum, weighted mean and extreme years' lowest bringe temperature can be read of as a function of annual energy extraction rate per m/sp2/ of ground surface, type of soil, site, depth of pipe burial and distance between pipe loops. The results from these simulations show that it is particularly the type of soil and climate that are important parameters for determining the possible energy extraction rate. The distance between the pipe loops also influences the amount of energy that can be extracted, but the depth of burial of the pipe has less effect. However, the depth was already limited to a relatively narrow range by what was regarded as practical to bury. It should be noted that snow cover has a considerable effect on the amount of energy that can be extracted. With 53 figures and 19 refs.

47634 **(BFR-R—35-1986) Glazed spaces. Climate and use of energy. Experiences from measuring projects.** Lange, E. (Swedish Council for Building Research, Stockholm). 1986. 82p. (In Swedish). NTIS (US Sales Only), PC A05/MF A01. File Number DE87753085.

This report is a summary of the experiences gained in the course of three glazed space projects in which comprehensive measurements were made. Different types of glazed spaces, both heated and unheated ones, are described and some measurement results are presented. Likely requirements regarding climate and energy use in glazed spaces are discussed. For instance, the maximum and minimum temperatures must be calculated and a building with glazed spaces must not use more energy than similar building without such spaces. The temperature in the glazed space at any time is determined by the relationship between its energy gains and losses. The dynamics have an effect of equalising the temperature. Some example calculations illustrate the consequences which the design of the glazed space and the surrounding elements of construction has on temperature levels and energy use. Energy is not usually saved to such an extent that provision of glazed spaces can be termed an energy conservation measure. However, a glazed space will make possible other savings which may be considerably larger than any savings in energy which may be made.

47635 (BFR-R—42-1986) Glazed courtyards in the renovation of existing buildings. Carlsson, P.O.; Eek, H.; Helmrot, A. (Swedish Council for Building Research, Stockholm). 1986. 113p. (In Swedish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753083.

Many building projects in recent years have included glazed canopies for courtyards, streets, galleries and suchlike. There has been far less activity of this kind hitherto in projects for the refurbishment and rehabilitation of previous development. This is because the conditions and opportunities associated with roof glazing in renovation are different from those applying to new production and have been relatively little studied. A pilot study has been undertaken in order to improve our knowledge regarding the implications to property administrators of roof glazing in connection with renovation. This report presents findings from the pilot study. It begins with a summary of experience of existing glazed courtyards, and it then goes on to describe a number of existing types of buildings and the possibilities of fitting glazed canopies. The consequences of roof glazing are analysed in closer detail as regards use and experience, architecture and townscape, technical solutions, energy economics, environmental aspects and property economics with reference to four selected projects, service accommodation for senior citizens in Soederhamn, the Goeteborg College of Applied Arts, multi family dwellings in Stockholm and sun rooms in Noresund, Alingsaas The report ends with a summary of the principal conclusions and of criteria for selecting buildings for roof glazing. Appended to the report are a list of current projects and presentations of some of the glazed-canopy projects which have been studied more closely.

47636 (BFR-R—47-1986) Ventilation heat exchangers - do they work in private dwellinghouses?. Abrahamsson, M.; Maansson, M. (Swedish Council for Building Research, Stockholm). 1986. 239p. (In Swedish). NTIS (US Sales Only), PC A11. File Number DE87753094.

The object of this project is to elucidate how FTX (mechanical inlet and extract ventilation with heat exchanger) systems in private dwellinghouses work after a few years operation. A total of 70 private dwellinghouses selected at random with 9 different types of plant, were subjected to a half-day inspection comprising measurements, checks and interview. A questionnaire was sent to another 215 households. Contractors building private dwellinghouses, property managers and chimney sweeps were also interviewed. Taken over all the 70 houses, each house had three different types of serious defect in the ventilation system which results in reduced energy savings, imbalance with the risk of mould, high noise levels and lower air comfort. The investigation shows that FTX system in private dwellinghouses do not work satisfactorily, but the types of defects are well known and can be eliminated in future systems. (authors).

47637 (BFR-R—58-1986) Vent insulation. Tests in climate chamber. Carlsson, P.O.; Sjoelund, J.; Soedergren, D. (Swedish Council for Building Research, Stockholm). Jan 1986. 59p. (In Swedish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753082.

Vent insulation is a design principle which involves dividing the climate shell of a building into two layers. The ventilation air is admitted through the air slot thus formed. This air is then preheated by the transmission energy through the inner layer. If necessary, the air is additionally heated in a special heating unit in the floor. The aim of the project is to investigate possible savings in building, operating and maintenance costs. In an introductory stage, measurements have been made in a climate chamber on a I-storey high test wall. The measurements have concerned the function of both the air slot and the heating device. The tests in the climate chamber show that the principle functions satisfactorily, that the effect of the air slot corresponds to a lowering of the coefficient of heat transmittance from 0.27 to 0.17 and that the amount of energy saved is approximately 10 kWh per m/sp2/ outer wall and year.

47638 (BFR-R—59-1986) Stockholm project. Power and energy simulations with BRIS and DEROB computer programs. Isfaelt, E.; Johnsson, H. (Swedish Council for Building Research, Stockholm). 1986. 150p. (In Swedish). NTIS (US Sales Only), PC A07/MF A01. File Number DE87753084.

This project is part of the Stockholm project, which is concerned with testing and development of building and energy technology with the aim of attaining low energy power requirements in multi-family residences. The project describes the energy and power requirements for the five experimental buildings included in the Stockholm project. The energy and power requirements are based on theoretical computer simulations in which the basic data for the individual buildings and the principles underpinning the heating, water and sanitary engineering systems have been fed in. The report describes how the individual buildings are built up and which systems are installed. The experimental buildings are fully operational and will be measured and evaluated until 1988. The analysis of measurement data will be based on the theoretical energy and power requirements presented in this report. The energy consumption figures presented in the report for the different buildings vary between 78 and 124 kWh per m/sp2/ apartment area and year. These figures relate to purchased energy for heating, ventilation, domestic hot water and electricity. The energy balances also include transmission, leakage and sewage losses as well as passively supplied energy and personal heat.

47639 (IVO-A—05/87) Apartment-specific energy measuring and invoicing system in a multi-storey building with electric heating. Ikonen, O.; Simola, I. (Imatran Voima Oy, Helsinki (Finland)). 1987. 93p. (In Finnish). NTIS (US Sales Only), PC A05/MF A01. File Number DE87753341.

The aim of the study was to analyse how an invoicing system based on apartment-specific measuring would change energy consumption and to judge the feasibility and fairness of the system. In this system the invoicing of household electricity is based on apartment-specific measuring and the invoicing of heating electricity is halfly based on measured energy consumption and halfly on the living area. The study was carried out in a housing corporation in Peltosaari district in the town of Riihimaeki on January 1, 1985-December 31, 1986. The invoicing system was taken into use on January 1, 1986. Equalization rates were charged or paid four times during 1986. Energy consumption in the house under study was compared with that in four other houses, in one of which consumption of household electricity and heat was also recorded in each apartment. The opinions of the inhabitants were surveyed. Consumption of heating energy had dropped by 3% in the house under study during the period 1985-1986, whereas the change in the comparison houses varied from 1% to 16%. Total electricity consumption declined by 8% in the house under study, whereas the corresponding change in the comparison houses varied from -11% to +15%. According to the survey only 3% of the inhabitants considered that the invoicing system had greatly changed their living habits and 27% considered there had been a slight change. The invoicing system could not be shown to have changed energy consumption in the house under study. This invoicing system is more fair than a system that is solely based on the living area or energy measuring in an apartment. The invoicing coefficients, which are theoretically determined, do not take heat leaks caused by construction defects into account. Inhabitants considered the invoicing system to be fair.

47640 (KTM/E-D—121) Influence of the thermal mass and heat distribution system on the energy consumption of small houses. Kalema, T.; Martikainen, H. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 115p. (In Finnish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753339.

In two test houses it has been studied how the thermal mass and the heat distribution system influence on the energy consumption of small houses. The other was a light wood element house without any massive walls, and the other a heavy concrete element house, where the whole exterior envelope was massive. In both houses the wall structures were consistent with the normal Finnish way to build. The heat distribution systems were the water radiator heating and the electrical radiator heating. The first had thermostatic radiator valves and the outdoor air compensation of the inlet water and the latter electronic control with loose sensors. The influence of the thermal mass was negligible. As a matter of fact the light house took 1% less heating energy during the heating season than the heavy one. In the winter the light house took 0-2% less and in the spring 5-10% more energy than the heavy one. Also the

indoor air temperatures were about same in both houses. There was a little difference in the maximum temperatures, which were about 2 deg C lower in the heavy house. The conclusion from the measurements was, that the thermal mass has no practical effect in small houses in Finnish climate. The influence of the thermal mass was also studied with the heat balance program TASE. The calculation were performed with a light and a heavy house, which had the same structures as the test houses. The calculations gave as result, that the annual energy consumption in the heavy house is 1-3% less than in the light one. The input data used in calculations has a big influence. With unreal input data the influence of the thermal mass may be as high as 10%.

47641 **(KTM/E-D—122) Decentralized HVAC and plumbing system. Preliminary study.** Ripatti, H.; Halttunen, M.; Saaristo, P. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 120p. (In Finnish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753061.

It was studied how the building codes, design standards and other regulations given by the authorities affected the utilization of decentralized systems. As the results of analysing work, two HVAC systems were selected to be evaluated carefully in the further research projects. These two systems were: Hydronic heat pump system and Room air conditioner system. Regarding to domestic water distribution the utilization of natural gas was found the most interesting and promising way to use a decentralized domestic water heating system. More research and development work is needed to bring competitive products into the markets. Decentralized systems seem to match well the requirements set by building occupants and construction industry in the near future. Specially the following criteria are fulfilled: energy economics, individual indoor condition control possibilities, room by room retrofit requirements, flexibility to use rooms for multipurpose operations and operating airconditioning only when occupants of the room are present. As a result of analysing decentralized HVAC and plumbing systems the following estimations can be made to show how these systems can be made to show how these systems can be utilized in new construction and retrofit projects as well as what is the potential for the energy savings: new construction 10-20 GWh annully and retrofit 0.5-3.0 GWh annually.

47642 **(KTM/E-D—128) Exhaust air heat pumps. Commercial and official buildings, multi-family houses.** Haemaelaeinen, E.; Wiksten, R.; Markkanen, S.; Sulamaeki, H.; Kuuskoski, T. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 252p. (In Finnish). NTIS (US Sales Only), PC A12. File Number DE87753342.

The research report consists of three parts. In each the features and experiences of exhaust air heat pumps in buildings for heating and heat recovery is described. The first part reports on exhaust air heat pumps for commercial buildings. The second and third part deals with exhaust air pumps for multi-family houses. Some of the apartments are heated with warm air heating. The exhaust air heat pumps for commercial buildings can be used for heat recovery in the winter and for cooling in the summer. The exhaust air heat pump reduces the demand for heating energy 40-50% in commercial buildings. This is compared to a situation with no heat recovery. The maximum heating power is reduced by 20-25%. Approximately half of the energy comes from electric motors to the compressors. The other half comes from oil or district heating. The second part of the report deals with exhaust air heat pumps in multi-family buildings with warm air heating. The warm air heating system is separated into apartment units. The heat exchangers in the warm air heating system has the same water as used as domestic hot water. The exhaust air heat pumps are in five small multi-family district houses. The pay-back time for the heat pumps was 22 years with a 5% interest. The heat pumps were not profitable. The payback time would have been 15 years with the designed coefficient of performance 3. In the third part of the report the potential of exhaust air heat pumps in multi-family buildings was investigated. About 55% of multi-family buildings outside district heating areas are such that exhaust air heat pumps could be used. The exhaust air heat pumps for multi-family buildings were investigated in six pilot projects. The energy from the heat pumps was 10-34%, in the average 27%, of the demand. The coefficient of performance was 1.8-2.8, in the average 2.4. The relative running time was 40-87%, in the the average 2.4.

47643 **(KTM/E-D—130) Atriums in office buildings.** Ahtila, P.; Yrjoelae, J.; Hejazi-Hashemi, M. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 195p. (In Finnish). NTIS (US Sales Only), PC A09. File Number DE87753340.

The design of an office building atrium can provide beneficial results in energy conservation in addition to its more familiar role in providing lighting for work areas. This study deals with the thermal behavior of office building atriums, their design considerations, energy economy and the resulting effects on the HVAC-systems of office buildings and building costs. Recent developments in atrium design are reviewed and energy analysis techniques are described. A simulation program is developed based on the transfer function method. A case study is made of an office building with two atriums. The energy performance of these atriums and their open courtyard alternatives are analysed and compared. The simulation program is evaluated and enhanced. The study shows that the achievement of atrium energy economy is based on the following factors: Target temperature, ventilation, realization, geometry and envelope construction. Heating energy use is reduced during the heating season as the atrium, together with its skylight, operates as a passive solar collector. For the same reason, the cooling energy use may be increased during the cooling season unless this heat gain is reduced. Openings and air gates are used to control the temperature in the atrium during this season. If this natural ventilation is not sufficient, wither exterior or interior shading devices may be used. The case study shows an atrium heat-loss saving of 15% and 17% for the two atriums over the corresponding open courtyard envelopes when the target temperature in the atrium in 17 deg C during the heating season. It also shows a cooling energy use incrase of 5% and 7% over the open courtyard alternatives during the cooling season when the atriums are ventilated naturally but not cooled and the target temperature is 25 deg C for the rooms around the atriums.

47644 (LBL—22153, pp 3.29-3.39) **Energy performance of buildings.** Sherman, M.H.; Amarel, I.; Chittick, G.; Cleary, P.G.; Diamond, R.C.; Dickerhoff, D.J.; Dumortier, D.; Ericksson, G.; Feustel, H.E.; Haugen, T.; Lewicki, L.L. May 1987. NTIS, PC A03/MF A01. File Number DE87013959.

In Applied Science Division Indoor Environment Program: Annual report, FY 1986.

The Energy Performance of Buildings Group (EPB) carries out fundamental research into the ways energy is expended to maintain desirable conditions inside buildings. The authors results form the basis of design and construction guidelines for new buildings and retrofit strategies for existing buildings. Their primary areas of research are air infiltration and retrofit research. In this article, the work carried out over the last year is split into five overlapping sections; 1) building energy retrofit research, 2) air infiltration, 3) International energy Agency support, 4) air leakage, and 5) appliance performance testing. The emphasis in their work is on whole building performance. They collect, model, and analyze detailed data on the energy performance of buildings, including the micro-climate, the building's thermal characteristics, the mechanical systems, and the behavior of the occupants. Because of the multidisciplinary approach they work closely with other groups, both at the Laboratory and elsewhere. 23 references, 9 figures, 1 test.

47645 **(NEI-FI—7) Saving of energy in supermarkets. Final report.** Kuusikoski, T.; Rusi, L.; Innanen, S. (Suunnittelurengas Oy, Helsinki (Finland)). 2 Jun 1986. 60p. (In Finnish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753332.

The motive of the project was to find out the means to reduce the supermarkets energy consumption in improving both HEPAC- and refrigeration devices in 16 test plants. The pay-off time of investments in HEPAC devices varied a lot. The efficiency of refrigeration plants was mainly improved by installing heat reclaim condenser systems. The payback times were: serial hooked heat reclaim system (4.4 y), heat recovery water heating with heat pump (7.6 y), parallel hooked heat reclaim system (7.7 y), hot gas

heat reclaim to tap water (10.0 y). The biggest energy consumers were department stores, built mainly in the 1960's, size of which varied from 8,000 to 95,000 m"3. The lowest energy consumption were in the supermarkets (15,000-145,000 m"3). The energy consumption differences in supermarkets were mostly caused by the differrent types of air conditioning solutions.

47646 **(ORNL/CON—221) Simulation of the SWTMS [Southwest Thermal Mass Study] test cells using the DOE-2.1A model.** McLain, H.A.; Christian, J.E.; Ohr, S.Y.; Bledsoe, J.L. (Oak Ridge National Lab., TN (USA)). Sep 1987. Contract AC05-84OR21400. 121p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE87014628.

The DOE-2.1A program was used to check the internal consistency of the detailed experimental data for the Southwest Thermal Mass Study test cells. It was concluded that, overall, the data are internally consistent and that they can be used to evaluate building envelope thermal mass effects. Some of the detailed thermal phenomena, such as the cell interior air temperature gradients, could not be explained fully because of the simulation model limitations. The program was then used to predict the effect of thermal mass on heating energy for different cells having the same envelope thermal resistances. It was predicted that there would be small annual heating energy savings (5 to 7% for Albuquerque, NM, and 3 to 4% for Washington, DC) for the insulated adobe and concrete block wall cells compared to the frame wall cells.

47647 **(ORNL/M—329) The Roof Research Center: A National User Facility for thermal performance and durability of roofing systems: Interim users manual.** (Oak Ridge National Lab., TN (USA)). 10 Apr 1987. Contract AC05-84OR21400. 21p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000056.

The Roof Thermal Research Apparatus (RTRA) is a small building at ORNL with replaceable roof panels and a controlled interior. Test panels are exposed to the East Tennessee weather, and well-calibrated instruments record all relevant data. Designed to accommodate a wide range of one-dimensional thermal and moisture tests, the RTRA has several current and anticipated areas of research: thermal performance under in-service conditions, effects of surface treatments (stone, pavers, color, etc.) on thermal performance, evaporative cooling, light-weight concrete decks, field validation data for mathematical models, examination of field measurement instrument packages, and moisture migration.

47648 **(PB—87-196580/XAB) Hot-water use in low-income households and the ability of integral solar water heaters to accommodate these requirements. Special report.** McLean, D.; Basson, J.A.; Jammine, E.J. (Council for Scientific and Industrial Research, Pretoria (South Africa). National Building Research Inst.). 1985. 29p. (NBRI-BOU—75). NTIS, PC PC E05/MF E05.

North American Continent sales only.

One hundred commercial integral solar water heaters (ISWHs) were donated for research purposes and installed on houses in three low-income townships in the Transvaal. Data were gathered on hot and cold water temperatures, on hot water and electricity consumption, and on the adequacy of the hot water supplied. The attitudes of users to the units, and that of neighbors and friends, was assessed as well as the users', neighbors', and others' awareness of the technology involved in the project.

47649 **(PB—87-214565/XAB) Conventional research house planning, acquisition, instrumentation, and characterization tests. Topical report, December 1983-August 1986.** Zawacki, T.S.; Foote, D.F.; Ketels, P.A.; Banasiuk, H.; Elkins, R.H. (Institute of Gas Technology, Chicago, IL (USA)). Mar 1987. 87p. NTIS, PC A05/MF A01.

A 30-year-old, one-story, detached, single-family dwelling, with full basement, three bedrooms, and a floor area of 1150 square feet, was acquired, instrumented, and was characterized during the 1985-86 heating season. This conventional research house is located in Chicago, Illinois, and was selected because it is typical of a very large segment of existing houses in the East-North-Central region of the U.S. For the heating-characterization test, the house was equipped with a natural-gas-fired, central forced-air, power-vented, heat-pipe furnace and a storage water heater; a powered humidifier; electronic air cleaner; and a central electric air conditioner. The results of these tests will serve as the baseline for testing zoned warm-air furnaces, desiccant cooling, gas-fired heat pumps, and other advanced gas appliances.

47650 **(PB—87-215935/XAB) Technology status of components for gas-fired cooling systems. Topical report, July 1986-January 1987.** Patel, R.F.; Teagan, W.P.; Fitzgerald, K.; Dieckmann, J.; McFadden, D. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Apr 1987. 165p. NTIS, PC A08/MF A01.

Gas-fired cooling system components' performance, cost, market availability, technology status, and other relevant data were collected using Arthur D. Little's in-house data base, open literature, interviews with professionals in research institutions, government agencies, universities, and manufacturers. A comprehensive data base of information market availability, performance, cost, and developmental status for gas-fired cooling system components and competing electric technologies is developed. Components of auxiliary technologies such as cooling towers and cold storage are included. Screening of the multitude of possible gas-fired system configurations has led to the selection of six major candidates (with a few permutations on each) for further analysis. Four competing electric-cooling systems with their own auxiliary system components were also configured.

47651 **(PB—87-215943/XAB) Evaluation and testing of trochoid refrigerating compressor. Final report, January-June 1986.** Wurm, J.; Czachorski, M.; Kountz, K.J. (Institute of Gas Technology, Chicago, IL (USA)). Mar 1987. 83p. NTIS, PC A05/MF A01.

The prototype RC-115 refrigerating compressor of Trochoid Power Corporation was found to be a technically good potential alternative to currently marketed machines. It could qualify as a practical member of the rotary, positive-displacement group with various refrigeration applications. However, it requires further development to realize the benefits of potential advantages the design of outer-envelope trochoid machines offer. In limited evaluation and testing, several areas that would need further attention became apparent. The compressor displayed relatively low leakage from the compression space. However, in its present prototype version it has a high clearance volume that is detrimental to high-pressure ratio efficiency, and appears to have high throttling losses. A redesign of the compressor to decrease throttling losses is required to bring the goals of high-speed operation closer to success.

47652 **(PB—87-215968/XAB) Effect of water quality on residential-water-heater life-cycle efficiency. Final technical report, September 1985-December 1986.** Talbert, S.G.; Stiegelmeyer, W.N.; Stickford, G.H.; Locklin, D.W. (Battelle Columbus Div., OH (USA)). May 1987. 29p. NTIS, PC A03/MF A01.

See also PB—86-157906.

During this last year of a 4-year test program, four of the original six residential-type gas-fired water heaters in Columbus, Ohio were operated another year under accelerated test conditions to measure the long-term effects of scale buildup on operating efficiency, and to assess the benefits and limitations of common water-treatment methods. The final results from this last year of testing are as follows: A scale buildup of 130 pounds in one of the hard water heaters after 30 months of operation under accelerated test conditions (representing about 50 years of normal residential usage) caused the operating efficiency to decline about 12 percentage points more than a comparable unscaled water heater. This scale buildup also caused the metal temperatures around the burner area to become so hot that distortion occurred and a leak developed from a crack through a weld joint. Although scale buildup was minimized with softened water, the magnesium anodes were consumed much more rapidly than in untreated hard water. This additional anode consumption will reduce its effectiveness in protecting the uncoated portions of steel tanks from corrosion. Several design suggestions are offered for improving the design of residential water heaters to minimize scaling and corrosion.

47653 **(PB—87-218145/XAB) Development of a pulse-combustion space heater. Final report, March 1982-April 1987.** Borgeson, R.A.; Thrasher, W.H. (American Gas Association Labs., Cleveland, OH). Apr 1987. 88p. NTIS, PC A05/MF A01.

See also report for Jan 1983-May 1984, PB—85-149730.

A high-efficiency pulse-combustion space heater was developed over a five-year period. Initially, a cast combustor unit was designed that operated with a thermal efficiency in excess of 90% at an input rate of 18,000 Btu/hr. This model was successfully tested in the field during the 1983/1984 heating season. During the 1984/1985 season, these units were used to prove the concept of heating substantially all of a residence with a space heater, thereby reducing the load on the central furnace. A new participating manufacturer joined the program in early 1985. The unit was redesigned to allow fabrication by stamping and room humidification by evaporation of condensate. Extensive sound-attenuation work succeeded in reducing sound levels to as low as 56 dBA. The redesigned units operated with a thermal efficiency in excess of 90% at an input rate of 20,000 Btu/hr. They were successfully tested in the field during the 1985/1986 heating season. The participating manufacturer conducted additional field experiments during the 1986/1987 heating season, and expects commercialization in 1988.

47654 **(STU—85-4913) Frost formation in heat exchangers - a literature study.** Karlsson, I.; Sunden, B. (Swedish National Board for Technical Development, Stockholm). 20 Mar 1986. 31p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753350.

Both theoretical and practical studies of freezing in heat exchangers are discussed in this report. The theoretical studies deal mainly with influence of relative moisture, temperature levels and flow conditions. Geometries are treated to some extent, and the heat conductivity of the frost is dealt with in a few references. The applied studies are more rare and less comprehensive. Research needs are deduced from this study, e.g. the influence of surface coatings of different types, and a detailed study of corrugated heat exchange surfaces are suggested. (L.E.). With 30 refs.

47655 **(SV-UL-FUD-B—86-10) Ground coupled heat pump with a multiple well system as heat source for heating of apartment buildings.** Spante, L.; Larsson, M.; Oesterberg, R. (Swedish State Power Board, Aelvkarleby). 17 Sep 1986. 11p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753117.

The Swedish State Power Board (SSPB) is actively encouraging the introduction of heat pumps in Sweden. To enlarge this work SwedPower, to a major part owned by SSPB, will work for an increased international exchange of heat pump experiences and for a transfer of Swedish know-how to other markets. The program carried out by SSPB includes today 450 demonstration plants of which 30 are ground coupled heat pumps for apartment and school buildings, with vertical pipes in a multiple well system as the heat source. In order to decrease the required bore-hole depths some of the systems are equipped with simple air convectors or solar collectors for recharging of the wells. The Kragstalund plant, near Stockholm is presented. It consists of three kW heat pump systems installed in identical new apartment buildings. Bore-hole depths and degree of recharging differ between the three systems. The plant shows good annual performance and is more cost-effective than corresponding system with electrical boilers. Measurements and computer simulations for one of the three systems show that the positive effect of recharging with air convectors is small. In Sweden it is usually more cost-effective to design a multiple well system with optimal bore-hole depth, than to design it with recharging. (authors).

47656 **(TKK-LT—36) Simulation model for evaporation equipment.** Laurila, J. (Tampere Univ. of Tech. (Finland). Thermal Engineering). 1985. 178p. (In Finnish). NTIS (US Sales Only), PC A09/MF A01. File Number DE87753329.

This study is a part of the Project "Energy sources of a heat pump, heat storages and their applications in heating of buildings" financed by The Ministry of Trade. The report handles a simulation model of evaporator equipment and theories behind it. A simulation model for studying reversed Rankine cycles has been constructed and a computer program has been erected in this work. The model is modular and is based on the successive substitution method. The Newton-Raphson method is used for the solution of sets of nonlinear equations. The thermodynamic and transport properties of the working medium are determined with the aid of the equation of state and other empirical and semiempirical formulas and can be calculated at any point of state of the process. The refrigerants used in the present version are R12, R22 and R502. The model consists of different types of basic components of the process. There is also possibility to use modified connections between the components. The results of the model are illustrated with an example.

47657 **(TTKK-LT—52) Binary mixtures in exhaust-air heat pump.** Aittomaeki, A.; Keskitalo, A. (Tampere Univ. of Tech. (Finland). Thermal Engineering). 1985. 42p. (In Finnish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753330.

The study is a part of the IEA porject "Advanced Heat Pumps, Annex 6". The aim of the study was to find out by field measurements how the use of ozeotropic binary mixtures would improve operation of small exhaust air driven heat pumps. Special attention was payd to pipe joints of evaporator battery. A computer controlled measuring equipment was built up. The measurements were made with the mixtures R12/R13B1, R22/R114 and R12/R13 and with some concentrations. The reference measurements were made with pure substances R12 and R22.

47658 **(TYOT-JULK—276) Kitchen ranges for both central heating and cooking.** Tuomi, S.; Sillanpaeae, M.-L.; Kouki, J. (Tyotehoseuran Julkaisuja, Helsinki (Finland)). 1986. 121p. (In Finnish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753063.

There was no clear effect upon stove efficiency or output found in comparing the different fuels: dry chopped firewood, wood briquettes, peat briquettes and sod peat. The mean fuel conversion efficiency to the boiler water at the rated output when using intermediate storage was 45-55%, according to stove make. The ranges differ in their draft control systems. The type of draft control in general use in Finland for small boilers burning domestic fuels proved safer than that on the imported stoves. The imported stoves' draft control was strongly dependent upon the flue draft. Sod peat was not very suitable for handling in connection with central heating ranges, because of the large amount dust. Peat briquettes were also dirtier than chopped firewood or wood briquettes. The average emissions of central heating ranges were not significantly different from those of other small boilers burning domestic fuels. The interviews and observations shoved that the actual conditions of use were not the best possible. Most of the ranges were plumbed into the heating system without intermediate storage. Under these contions control of output is quite difficult. Fire safety was variably taken into account. Dwelling comfort conditions sometimes suffered due to incorrect methods of installation or wrong user operation. These deficiencies could however easily be corrected. One advantage of situating the stove within the living space, is that radiated heat losses are into the dwelling as useful heat. In practice a part of this heat has to be dumped by ventilation, because the radiated heat is unevenly distributed in the dwelling, which users find uncomfortable, especially in summer in the kitchen. For the tests on cooking of food, the cooking top was heated with chopped firewood. A liter of water was brought to boiling point from a temperature of 20 deg C in 13-43 minutes, depending upon the make of stove and saucepan material.

47659 **Refrigeration apparatus.** Barron, E.J. (to Rejs Co., Inc., Las Vegas, NV). US Patent 4,683,726. 4 Aug 1987. Filed date 16 Jul 1986. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

A refrigeration system is described comprising a compressor, a condenser, a refrigeration metering or expansion device, and an evaporator connected in series with the outlet of the compressor connected to the inlet to the condenser to conduct compressed refrigerant gas to the outlet of the condenser connected to the inlet of the evaporator to conduct liquid refrigerant. The outlet of the evaporator connects to the inlet to the compressor to conduct va-

porized refrigerant. The system includes means circulating air over the evaporator to provide cold air to a selected space.

47660 **Hydrofluoric acid-resistant composite window and method for its fabrication.** Ostenak, C.A.; Mackay, H.A. (to Dept. of Energy, Washington, DC). US Patent 4,684,217. 4 Aug 1987. Filed date 18 Jul 1985. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

This patent describes a hydrofluoric acid-resistant composite window for visual access to an environment containing hydrofluoric acid, the composite window comprising: a. a window, the window having first and second sides, the first side being effective for orientation towards the environment containing hydrofluoric acid, the second side located opposite the first side; b. an adhesive disposed on the first side and cured to remove contained bubbles; and c. a layer of hydrofluoric acid-resistant transparent material, the layer being disposed on the adhesive and held over the first side. The layer completely covers the first side for protecting the first side from the environment containing hydrofluoric acid.

47661 **Laser sealed vacuum insulation window.** Benson, D.K.; Tracy, C.E. (to Dept. of Energy, Washington, DC). US Patent 4,683,154. 28 Jul 1987. Filed date 19 Aug 1985. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

A thermal resistant panel is described comprising two panes of glass positioned closely spaced apart in substantially parallel relation to each other. Spherical glass bead spacers are positioned between the two panes of glass to maintain the spacing while minimizing the thermal conduction between the panes. A continuous glass joint around the periphery of the panel seals the edges of the two panes together.

47662 **Air flow distribution in an apartment house.** Feustel, H.E.; Lenz, T.P. (Lawrence Berkeley Lab., CA, USA). *HLH, Heizung, Lueftung, Klimatechnik, Haustechnik;* **38**: No. 4, 173-183(Apr 1987). (In German). Contract AC03-76SF00098.

An alarmingly low change of outside air in the annual average was shown by calculations already published to simulate the infiltration through cracks of buildings with different floor plans. In this contribution, the authors present the influence of different ventilation strategies on the air flow distribution and its size for an apartment building. The complexity of air flow distribution within a building is hereby demonstrated. For the interpretation of the results, four dimension-free index numbers describing the air flow of buildings, are used. The results of the simulation calculation are confronted with measured figures gained by other authors within the research project 'Ventilation of Housings' (Lueftung im Wohnungsbau).

47663 **Determinants of electricity use for residential water heating: the Hood River conservation project.** Hirst, E.; Goeltz, R.; Hubbard, M. (Oak Ridge National Lab., TN, USA). *Energy Conversion and Management;* **27**: No. 2, 171-178(1987).

Because 85% of the homes in the Pacific Northwest have electric water heaters, water heating is the second most important residential electricity end-use in the region. This paper analyses the determinants of water-heating electricity use, using end-use load data and responses to a detailed home interview. These data are available for 142 homes in Hood River, Oregon. On average, these homes used 5000 kWh/yr for water heating. Almost 60% of the household-to-household variation in electricity use was explained with eight variables in a simple regression model. The number and ages of household members are the strongest determinants of electricity use: use increases by roughly 1000 kWh/yr with each additional household member. Other statistically significant determinants of water-heating electricity use are hot-water temperature, water-heater location, number of showers in the home and house type. Electricity use varies considerably throughout the year. Weekly usage was 50% higher in mid-winter than in summer. About half of this temporal variation is due to changes in outdoor temperatures and half is due to seasonal changes in behavior.

47664 **Cost reductions in absorption chillers.** Leigh, R. (Brookhaven National Lab.). pp 1004-1010 of Proceedings of the 1986 international gas research conference. Cramer, T.L. Rockville, MD; Government Institutes Inc. (1986). (CONF-860904—).

From International gas research conference; Toronto, Canada (8 Sep 1986).

Absorption chillers have great difficulty competing with the electric-driven compression alternative, due to modest operating efficiencies and high first costs. Here the author assesses the possibility of lowering the costs of absorption chillers dramatically by the use of low material intensity. The author established breakeven costs for absorption chillers, their heat exchangers and heat exchanger materials. He identified polymeric and metallic materials appropriate to particular components and which meet the cost goals. He tested a subset of these materials and ordered them by success in tolerating conditions found in absorption chiller applications. He developed conceptual designs which indicate the practicality of the low material intensity approach.

47665 **What works: Documenting the results of energy conservation in buildings.** Harris, J.; Blumstein, C. New York, NY; American Solar Energy Society (1983). 560p. American Solar Energy Society, 110 West 34 St., New York, NY 10001.

Covering a broad spectrum of technical and socioeconomic issues, authoritative reviews by leading scientists, engineers, architects. designers, economists, planners, administrators and other researchers are brought together and summarized in this volume. A volume has been developed jointly by ASES and the American Council for an Energy Efficient Economy. As an important milestone in the literature of solar energy and energy conservation, WHAT WORKS offers an evaluation of experience in the application of present technology during the energy crisis years. Summarizing energy performance in terms of economic effectiveness and available options for the future, leading authors provide the facts.

3202 Transportation

REFER ALSO TO CITATION(S) 47669, 47715

47666 **(ORNL/TM—10333) Microcomputer-based vehicle routing and scheduling: An overview.** Klein, A.J. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 44p. NTIS, PC A03/MF A01; GPO Dep. File Number DE88000041.

Commercially available vehicle-routing and scheduling packages were surveyed to assess capabilities, categorize key characteristics, compare individual packages, and select candidate software for additional testing. Among the key characteristics addressed were backhauling, distance and vehicle travel-time calculation, geocoding, speed zones, natural barriers, time-window constraints, vehicle/stop matching constraints, and other constraints such as vehicle/driver operating costs. The survey included review of vendor literature, telephone interviews, site visits to review software, and the testing of demonstration packages on a set of sample distribution networks. Thirteen packages were reviewed; these were categorized by price and performance as follows; (1) inexpensive packages (costing $2000 or less), which solve the basic vehicle-routing problem but are somewhat limited in their ability to handle large numbers of vehicles and stops; (2) medium-priced systems (from $5000 to $20,000), which offer more capability to handle constraints such as multiple pickup and delivery, time windows, and multiple depots and provide manual intervention capability and enhanced graphics; (3) very expensive systems (from $50,000 to about $150,000), which can handle real-time situations in scheduling last-minute route changes and employ sophisticated graphics tools to change route schedules interactively. Out of the 13 packages, four demonstration vehicle-routing packages were obtained for testing of 4 sample networks; two of the packages were found to be capable of solving most vehicle-routing problem constraints for two versions of 21-city and 30-city networks.

47667 **(PB—87-203212/XAB) High-occupancy-vehicle treatments, impacts, and parameters (a synthesis). Volume 1. Procedures and conclusions. Final report.** Batz, T.M. (New Jersey Dept. of Transportation, Trenton (USA). Div. of Research and Demonstration). Aug 1986. 47p. (REPT—86-017-7767-1). NTIS, PC A03/MF A01.

See also Volume 2, PB—87-203220.

The report details the findings of 256 past and present high occupancy vehicle treatments that have been implemented. Volume I contains the procedures followed and the major conclusions found concerning the 19 specific high-occupancy-vehicle (HOV) treatment types studied. Some of these conclusions are that only five treatments (park-n-ride lots, separate roadways, contraflow freeway and arterial lanes, and preferential bypass at a metered ramp) produced the impacts expected. Another seven treatments either produced mixed results or had no effect on the expected impacts, while the remaining six HOV treatments had no reportable data collected or were never implemented.

3203 Industry And Agriculture

REFER ALSO TO CITATION(S) 47061, 47112, 47171, 47579, 48125, 48162, 48347, 48375, 48406

47668 **(BFR-R—27-1986) Group heating plants for industrial heating applications. Alternative heat production systems and potential for oil substitution.** Mattsson, C. (Swedish Council for Building Research, Stockholm). 1986. 112p. (In Swedish). NTIS (US Sales Only), PC A06. File Number DE87753093.

The object of this work has been to establish the feasibility of application of alternative heat production systems, and of their oil substitution potential, within industry. Work has been concentrated on group heating plants of such a type and size that heat pumps and solar energy could form an alternative to conventional technology. A total of 21 industrial sectors has been identified as potentially suitable, and a typical installation within industry has been selected. Energy application within the model industry has been established, and alternative heat production systems has been described. The material has then been entered into the data base for the SOL 85 model. Development in future years has been assessed forward for a period of ten years from the basic data, using the results from the SOL 85 analysis. Economic viability has been taken as necessary prerequisite for the introduction of alternative energy technology. The results indicate that there is a little likelihood of introducing solar energy within the 21 industrial sectors identified. Heat pumps, on the other hand are competitive in several applications, but their introduction would depend on the degree of trust placed by industry in new new technology. At present, the main competitors are electric boilers and solid fuel boilers.

47669 **(DOE/CE/15243—T1) Shrimp vessel test of the GSM-Marshall automatic marine propeller.** Veal, C.D.; Burrage, D. (Mississippi-Alabama Sea Grant Consortium, Biloxi, MS (USA)). 17 Aug 1987. Contract FG01-85CE15243. 20p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000149.

In a field comparison of the Marshall propeller with the standard fixed pitch propeller, the Marshall propeller exhibited greater bollard pull during all ranges of the test, and correspondingly, greater fuel consumption during those same ranges. Speed over the bottom during trawling and steaming was 9.8% and 11% greater respectively for the Marshall propeller when compared to a standard propeller. Speed over the bottom per unit of fuel consumed was 17.65% greater for the Marshall propeller during trawling and 6.67% greater during steaming. If a vessel were operating at a fixed engine speed, the addition of a Marshall propeller would allow the towing of larger, and thus more productive, nets. If a vessel owner or captain were to choose to maintain net size, then a reduction in engine speed and thus a corresponding reduction in fuel consumption, would occur. When the wheel was operating at any given rpm under load, and the engine and shaft speed decreased suddenly, insufficient damping was built into the Marshall propeller, so that a substantial vibration of the vessel occurred. This problem could be remedied by increasing the damping of the internal hydraulic cylinders of the Marshall propeller. While in operation, the Marshall propeller operated smoothly, free of the vibration normally associated with three blade propellers.

47670 **(DOE/CE/40702—T1) Application of chemicals to substrates without the use of liquids: Solid-on-solid (SOS) processing: Final technical report, August 1, 1984-July 31, 1986.** Cook, F.L. (Georgia Inst. of Tech., Atlanta (USA). School of Textile Engineering). 13 Dec 1986. Contract FG05-84CE40702. 234p. NTIS, PC A11/MF A01; 1; GPO Dep. File Number DE87013504.

Theoretically, the optimum method for applying chemicals to textiles is through deposition of powders, followed by dry thermal flow of a thermoplastic component. Bench-scale development has progressed rapidly in the first two years of the project for several SOS textile processes. Clear, well-defined color prints were achieved. A spun laced polyester nonwoven servicing the mattress pad cover market was successfully bound with two resins via powder spray gun deposition. Fluoropolymer (FP) powder finishing of a polypropylene (PP) nonwoven with the Nordson spray gun technology also proved feasible. Two main-component size candidates for ring-spun polyester/cotton yarns were evaluated: Carboset 525 (a complex acrylic, B.F. Goodrich) and Eastman WD (a modified polyester, Eastman Chemicals). Preliminary research was conducted to identify 100% solid liquid resin candidates for solid shade coloration of fabric. Blends of Lord Corporation's B3693-44 Photoglaze resin (a poly(urethane-acrylate)) with Sartomer's polyethylene glycol 200 dimethracrylate yielded uv-cureable films that had sought visual and qualitative properties.

47671 **(DOE/ID/12303—6) Fluidized bed waste heat recovery system: Program final summary, September 22, 1981-November 30, 1986.** Hoffman, L.C.; Williams, H.W.; Kreeger, A.H. (Aerojet Energy Conversion Co., Rancho Cordova, CA (USA)). Jun 1987. Contract FC07-81ID12303. 112p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE87014460.

This report describes the successful development and industrial field demonstration of a fluid bed waste heat recovery system (FBWHRS). Principal tasks were: component and system design; subscale development testing; procurement and fabrication; installation at the host site, Aluminum Corporation of America (ALCOA), Massena, New York; and a one-year system performance evaluation. The fluidized bed heat exchanger transfers energy from the hot flue gas of an aluminum remelt furnace to a Fluidfire design recirculating boiler for the production of plant steam. Development included anti-fouling with traveling, high temperature brushes and with a steam lance, plus provisions for reducing the entrainment of fluid bed particles. The flue gas was characterized with fouling and corrosion probes. This project allowed the flue gas temperature to the fluidized bed to be increased to 1100°F for improved efficiency and economics. The forecast simple payback for production units is 1.5 to 1.9 years depending upon the installation configuration.

47672 **(DOE/ID/12518—1) R and D on a fertilizer sensor and control system: Phase 1 report.** Colburn, J. (Aguila Corp., Pepperell, MA (USA)). 31 Dec 1986. Contract AC07-84ID12518. 127p. NTIS, PC A07. File Number DE87014929.

This report summarizes Phase 1 progress toward proving a new, energy-saving concept in agricultural practice - measuring in situ nitrogen fertilizer requirements and controlling the application of fertilizer as a result of that measurement.

47673 **(DOE/ID/12551—1) Investigation of the energy value of automobile shredder residue.** Hubble, W.S.; Most, I.G.; Wolman, M.R. (EnerGroup, Inc., Portland, ME (USA)). Aug 1987. Contract AC07-84ID12551. 64p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87013645.

This study evaluated the feasibility of using automobile shredder residue "fluff" as a fuel for on-site power generation. The evaluation includes analysis of economic and environmental parameters. A total of 125 shredding firms were contacted with 47 shredder operators responding representing 50 sites. Follow-up interviews provided insight into shredder operations and to the problems associated with using shredder fluff as a fuel. Twelve shredder

sites sent samples of fluff for evaluation. A sampling procedure was established to provide a meaningful representation of the shredder fluff. Laboratory analyses were conducted to determine the fuel characteristics of the material. Self-sustained combustion was achieved with shredder fluff in a rotary kiln test incinerator. Combustibles were 94% burnt out, leaving free-flowing, granular ash. Volume was reduced 80% and weight 55%. Air emissions could be controlled to acceptable levels with commercial equipment. Leachable lead levels in some incinerator test ash samples exceeded the Extraction Procedure (EP) toxicity limit. Use of sodium silicate or portland cement type reagents as additives resulted in reduced EP Toxicity levels for combustion ash. This study indicates combustion of automotive shredder residue with energy recovery should be considered as an alternative to landfill disposal. Actual statistical analysis of fluff from twelve shredder sites results in a mean value of 5400 Btu/lb. Assuming a more conservative Higher Heating Value of 5000 Btu/lb, fluff represents a current nationwide fuel value of 0.024 quads (0.025 EJ).

47674 (EPRI-EM—5285, pp 1.1-1.4) **Cogeneration issues faced by Houston Lighting & Power Company.** Simmons, D.E. (Houston Lighting & Power Co., TX). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Cogeneration is one of the most critical issues at Houston Lighting & Power Company. Under the umbrella of PURPA, cogeneration has developed broadly and is big business in HL & P's service area. It is believed that it has developed beyond the original intent of PURPA. HL & P has purchased over 32 billion kilowatt hours from qualifying facilities and paid about $1 1/2 billion to cogenerators over the past four years. HL & P is probably the largest purchaser of congenerated power in the nation. Fifteen percent of HL & P's load is served with cogenerated energy. This is expected to grow to a 25% share in 1990. A number of serious problems have surfaced in Texas and have grave implications not only for HL & P's customers but for electric consumers throughout the country. These questions and their long-term implications for cogeneration are discussed.

47675 (EPRI-EM—5285, pp 2.1-2.10) **PURPA implementation: federal regulations and their impact on electric utilities.** Bauer, D. (Edison Electric Institute, Washington, DC). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

The electric utilities' perspective of cogeneration is discussed. For many electric utilities, cogeneration may represent an economically viable and valuable energy and generating capacity resource. For others, in different circumstances, it appears that it will be difficult, and in some cases impossible, for cogeneration to make a meaningful contribution to the utilities' energy or capacity resources. Four issues that clarify the impact PURPA has had on electric utilities are described. First, a general perspective of PURPA is presented; second, some of the economic and regulatory challenges it has created are given; third, some of the operational concerns are highlighted; and, finally, PURPA is discussed in the context of an increasingly competitive bulk power market.

47676 (EPRI-EM—5285, pp 3.1-3.17) **Cogeneration and utility demand-side management.** Gellings, C.W.; Limaye, D.R. Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Changing energy economics and increased competition have heightened the awareness of customers to end-use options in industrial and commercial facilities. Combined with legislative and regulatory initiatives that have both removed some of the institutional barriers to on-site generation of electricity and provided incentives to cogenerate, these changes have made cogeneration an attractive technical and economic option for many industrial and commercial customers. In particular, the passage of the Public Utility Regulatory Policies Act (PURPA) in 1978 has resulted in a tremendous amount of activity relative to evaluation and installation of cogeneration facilities. The economic and institutional changes in the last decade that have favored cogeneration have also significantly changed the electric utility planning environment. High cost of new generation capacity, uncertain fuel economics and load growth, difficulties in siting new large central station facilities, and increased concerns on the part of regulators and ratepayers related to rate increases have led most electric utilities to reassess their traditional resource planning approaches. Utilities are now emphasizing demand-side management (DSM) options as alternatives or additions to traditional supply planning methods. Demand-side management encompasses a broad range of method and techniques to modify customer loads in a manner that would benefit both customer and the utility, and includes options such as load management, strategic conservation, strategic load growth, and cogeneration. The potential role of cogeneration in the utility's new planning environment is discussed.

47677 (EPRI-EM—5285, pp 4.1-4.4) **Electric utilities cogeneration symposium.** Morris, R.E. (Energy Factors, Inc., San Diego, CA). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

PURPA drove a wedge into the electric utility monopoly and opened the market at the retail level with cogeneration and at the wholesale level with small power production and the surplus energy from a cogenerator. PURPA has initiated a change in the way electric utilities will be structured in the future. If left to evolve in response to natural market forces, by the end of this century the authors will have an electric industry modeled after the gas industry with competing wholesale generation, common carrier transmission and regrettably, but unavoidably, regulated distribution retailers. This represents change and change implies uncertainty and all businessmen dislike uncertainty. But in the case of the utilities, they seem to believe change could be avoided altogether if the cause could be removed or neutralized. But simply repealing PURPA as some seem to advocate would not remove the stimulus for the change that has begun and is irreversible. Some of the problems involved in the implementation of PURPA are discussed.

47678 (EPRI-EM—5285, pp 5.1-5.25) **Cogeneration trends and prospects: implications for utilities.** Anderson, J. (Electricity Consumers Resource Council, Washington, DC). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Industrial firms often need thermal energy in their manufacturing processes. Cogeneration - the sequential production of useful thermal energy and electrical or mechanical power - is an efficient way to produce both electricity and steam. By capturing energy otherwise wasted, cogeneration can convey more than 75% of the energy content of fuel to useful work; the efficiency of conventional generation is less than half this amount. Prior to 1978, cogenerators found that utilities were able to use their monopolistic power to stifle many efficient cogeneration projects. Congress enacted the Public Utility Regulatory Policies Act of 1978 (PURPA), in part, as an attempt to neutralize the utilities' monopolistic advantages. PURPA has worked quite well. Indeed, between 1980 and 1985, the Federal Energy Regulatory Commission (FERC) has received nearly 2000 requests for qualifying status from potential cogenerators representing nearly 30,000 MW of capacity. Despite its success, utilities propose changes in PURPA because of certain alleged problems. These alleged problems, largely myths, are discussed.

47679 (EPRI-EM—5285, pp 6.1-6.6) **Cogeneration trends and prospects.** Bray, M.E. (General Electric Co., Schenectady, NY). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Cogeneration trends and prospects are discussed. Clearly, this is a time of significant change in the power generation industry - change which probably will continue to challenge and puzzle for years to come, making uncertainty the most important and common concern. Some thoughts on what's happening to power generation in this country are presented and discussed.

47680 (EPRI-EM—5285, pp 7.1-7.7) **Section 210 of PURPA revisited.** Stalon, C.G. (Federal Energy Regulatory Commission, Washington, DC). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

During the last year or so, several suggestions for a fundamental reevaluation of the regulations based on Section 210 of PURPA and how that regulatory scheme fits into the broader picture of evolving electricity supply options and their regulation have been made. Serious concerns are being expressed about how the scheme is currently working and how it will affect long-term power supply and its cost, especially to states such as Texas and California. Many of the concerns surfaced on Capitol Hill through two major sets of hearings in June. After several years PURPA suddenly emerged into full bloom in some states. At least two states, Texas and California, have started to ask fundamental questions that are important for the future of electricity supply. These two concerns that are prevalent are discussed and some implications for the future of electricity supply are suggested.

47681 (EPRI-EM—5285, pp 8.1-8.3) **PURPA revisited: the Massachusetts approach.** Levy, P. (Massachusetts Dept. of Public Utility Control, Boston). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

On August 25, 1986, the Department of Public Utilities (DPU) issued regulations designed to encourage the development of small electric power production facilities in the Commonwealth of Massachusetts. These regulations establish a procedure by which small power producers will receive long-term, fixed-price contracts for the electricity they sell to electric utilities. The regulations will stimulate the development of small power producers by making it easier for them to obtain financing for their generating projects and to compete actively to provide lower-cost power to utilities. The rules are designed to carry out the purposes of the Public Utilities Regulatory Policies Act (PURPA), a federal law passed in 1978 to encourage the development of small power production facilities, such as cogenerators, wind turbines and municipal solid waste/energy plants. The DPU found that the previous PURPA regulations, which were adopted in 1981, provided insufficient incentives for small power producers. The main features of the Massachusetts approach are presented.

47682 (EPRI-EM—5285, pp 9.1-9.7) **Modest proposals: a state regulator's experience and expectations in cogeneration.** Swisher, P. (Idaho Public Utilities Commission, Boise). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

The cogeneration and small-hydro community reached maturity in the Pacific Northwest just when the utilities of the region became surplus. The excess capacity of the utilities grew out of the completion of central baseload plants that had been planned during the nation's obsession with a perceived energy shortage. That same national preoccupation had also spawned the PURPA Act under which utilities were required to buy non-utility generation at a utility's avoided cost of new plant. The surplus is more a consequence of inexperience with price elasticity in the sale of electricity than of utility-regulator devotion to central plant over capturing energy wherever it is potentially available. Before 1979, the Northwest by one standard of measurement was consuming roughly four times as much electricity per capita as the rest of the nation used. The cost base was a complex of federal dams and private impoundments on the Columbia River system. Not only were construction costs remarkably low by today's standards, but the dams were put in place with federal dollars and the costs were shared with other uses of the rivers, such as irrigation, navigation, flood control, reaction, and the mitigation of the projects' impacts on commercial and sports fisheries. Cogeneration in the Pacific Northwest is discussed.

47683 (EPRI-EM—5285, pp 10.1-10.11) **Cogeneration: a major California resource.** Ajello, J. (California Public Utilities Commission, San Francisco). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Since 1980, the number of cogenerators and private power producers (QFs) in California has grown from a handful to more than 1256. With state wide peak demand at 40,000 MW, 3399 MW of QFs are on line and 12,261 MW are under contract for a total of 15,660 MW of committed resources. The California Public Utilities Commission has played a major role in the growth of this industry. By adopting standard power purchase contracts with attractive rates, it enables QFs to overcome initial utility reluctance to consider them a viable alternative to utility-owned generation. However, the unanticipated success of the program coupled with the sudden drop in marginal fuel cost has caused concern that utilities may have committed to purchase more capacity than needed and that ratepayers are being overcharged for both QF energy and capacity. This paper gives a brief history of the Public Utilities Commission's efforts to encourage QF development in California. Current issues in developing a long-run power purchase contract are described and near-term developments and policies are explored.

47684 (EPRI-EM—5285, pp 11.1-11.21) **Gas Research Institute's R & D Program for small cogeneration.** Hedman, B.A.; Davidson, K.G. (Industrial Technology Analysis, Chicago, IL). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

One of the overall objectives of the Gas Research Institute (GRI) is to develop improved gas-using equipment that is more effective, meets environmental standards, and offers the user competitive costs at an equivalent or higher quality of service then alternative energy options. Such development is considered extremely important in view of increasing competition among fuels and continuing national interest in energy security and conservation. One area where GRI has focused considerable attention is cogeneration. As a result of using domestic natural gas resources to supply energy services at a lower cost, natural gas-fueled cogeneration can yield significant benefits to all parties involved - the cogenerator, the rate payer, the natural gas utility and the electric utility. The implementation of cogeneration, accelerating rapidly in recent years as a result of the substantial economic savings potential of this technology, is discussed.

47685 (EPRI-EM—5285, pp 12.1-12.12) **Implications of small cogeneration systems for electric utilities.** Sullivan, P.W. (Thermo Electron Co., Waltham, MA). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Electric utility planning and policy must differentiate between small cogeneration systems and large cogeneration systems. Just as generation planning considers a mix of technologies and plant size, the cogeneration industry involves a similar mix. But most importantly, this mix responds differently to signals supplied by the utility industry. The factors at play are illustrated in one particular segment of the cogeneration industry - small packaged cogeneration systems. Packaged cogeneration systems are described in terms of technology, cost, performance and other operational parameters. Purchaser motivations are explored. Electric utility pricing and interconnect policies are used to describe how cogeneration system designs respond to energy pricing signals. Cogeneration system operating data are used to highlight potential electric utility impact. And the implications of equipment trends in the packaged cogeneration industry are discussed. Because the packaged cogen-

eration industry will continue to grow, only by understanding the factors behind this growth can the electric utility industry both accommodate and influence the impacts that packaged cogeneration systems will have on electric utility businesses.

47686 (EPRI-EM—5285, pp 13.1-13.8) **Packaged cogeneration: energy alliance between customer and utility.** Forster, C.J. (Northeast Utilities, Hartford, CT). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Faced with a much sharper load growth than anticipated a few years ago, along with scheduled retirements of older oil-fired generating plants, something was needed on the Northeast Utilities system to assure continuity of service to its customers. To accomplish this, the company has developed an integrated supply and demand program. Cogeneration has been utilized on both sides of this equation. That which is under contract is counted as firm capacity on the supply side. Cogeneration, which displaces a portion of the energy utilized by customers, assists the company's conservation programs to keep the growth in demand at a comfortable rate. Packaged cogeneration is anticipated to play a significant role in the displacement cogeneration effort. Every utility system is different. Northeast Utilities (NU) has had a goal since 1981 to effectively promote the installation of economical cogeneration and small power production projects. Each year the company publishes a booklet entitled Northeast Utilities Corporate Objectives and Goals. The goals and objectives of NU are discussed.

47687 (EPRI-EM—5285, pp 14.1-14.6) **Cogeneration issues.** Driggs, C.L. Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Delmarva Power was essentially bypassed by developers during the first eight years under PURPA. Delmarva's low cost of producing energy (15 to 30 mills/kWh depending upon time of day and season) has tended to deep the utility target group of utilities but has not stopped customers from seriously evaluating self-generation. Delmarva has had limited exposure to cogeneration for many years. The DuPont Company has operated a 28 MW facility at its Seaford, Delaware, nylon plant for some 40 years. Delmarva owns part and operates a 96 MW cogeneration plant serving the needs of Texaco's refinery at Delaware City, Delaware. Delmarva also provides process steam under contrast to DuPont's Edgemoor plant, adjacent to the Edgemoor Steam Station. The company's cogeneration involvement was basically limited to this activity until three years ago. Proposals have been received for nearly 400 MW of capacity at customers' sites since 1984. A profile of Delmarva Power is provided.

47688 (EPRI-EM—5285, pp 15.1-15.8) **Strategic issues concerning cogeneration.** Breuer, T. (Houston Lighting & Power Co., TX). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Because of the amount of independent power production and the potential for its expansion in Houston Lighting & Power Company's (HL & P's) service area, customers may have more to gain or lose than possibly any other group in the country. Houston Lighting & Power serves a population of over three and a half million people in a highly industrialized 5000 square-mile service area. In terms of kilowatt hour sales, HL & P is the seventh largest individual, investor-owned utility in the nation, selling 56 billion kWh annually. Fifteen percent of this is purchased from cogenerators. Approximately 49% of total sales go to 1800 large industrial customers. Many of these generate additional electricity for their own use, and some sell some of it to HL & P. The cogeneration issues of HL & P are discussed.

47689 (EPRI-EM—5285, pp 17.1-17.12) **Integration of cogeneration and small projects in the utility grid.** Nola, S. (Southern California Edison Co., Rosemead). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

The integration of cogeneration and small projects into the electric utility grid is presented in summary form. The subject is discussed under the following topics: renewable and alternative resources effective capacity, benefits, energy mix, area resource capacity, planned resource additions, 1985-1995, operational considerations with QF integration, standard contracts, overview of new S.O. 4 process, by provisions, pricing, and draft standard offer contract.

47690 (EPRI-EM—5285, pp 18.1-18.6) **Utility participation in cogeneration ventures.** Barba, L.D. (Energy Initiatives, Inc., Morristown, NJ). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

The formation of Energy Initiatives, Inc. (EII), by Jersey Central Power & Light Company (JCP & L) in the Fall of 1984 has its roots in the Three Mile Island (TMI) nuclear accident at Unit Number 2 in 1979. As a 25% owner of TMI, LCP & L found itself not only financially crippled but also short of capacity due to the loss of its share of 2600 MW of electricity from TMI Units 1 and 2. Utility management was faced with several critical operating decisions along with legal and regulatory matters that consumed much of management's time. The most serious of these matters was capacity shortage due to the loss of the two units at TMI. Fortunately, surrounding utilities, had considerable excess capacity during this period. The long-term solutions, however, needed to be addressed. After the TMI accident, JCP & L canceled the 100 MW Forked River Nuclear Station is had started. JCP & L, unlike many other utilities, was experiencing above-average load growth due to strong economic growth in New Jersey. While the utility was reviewing its options in light of its financial condition the Board of Public Utilities (BPU) was carrying on proceedings under the Public Utility Accident Fault Determination Act (Fault Act) to assess damages against the utility for its role in the TMI generating stations. These hearings resulted in a list of programs which JCP & L was to develop and implement in the areas of energy conservation, load management and cogeneration development. In the area of cogeneration, JCP & L agreed to establish an entity to develop cogeneration throughout the state of New Jersey. Upon receipt of the Securities & Exchange Commission's approval in February 1985, EII was officially born on April 1, 1985.

47691 (EPRI-EM—5285, pp 19.1-19.9) **Utility leadership in cogeneration.** Miller, D.L. Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Cogeneration is a once-dominant energy form that is enjoying a renewed resurgence due to today's energy economics. Utilities are in a prime position to assume a leadership role in this revitalized segment of power generation. Today's prime reason for cogeneration is the displacement of power; in simple terms, because of high electric rates and lower fuel prices, it is now less expensive for an industrial facility to produce its own electricity than it is to purchase it. Evidence of this situation is illustrated by the fact that, even though oil prices have dropped 40% during the past year, average industrial electric rates have remained virtually unchanged. The role of electric utilities in developing cogeneration is examined.

47692 (EPRI-EM—5285, pp 20.1-20.11) **Overview of EPRI cogeneration research.** Hu, S.D. Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

During the last decade, cogeneration has become an important option for many industrial and commercial customers. Cogeneration, the sequential production of two useful forms of energy, such as electricity and process steam, from a single energy input, is now being considered as a major alternative source of electric and thermal energy for many industrial and commercial facilities, resulting from changing energy economics and implementation of the Public Utility Regulatory Policies Act of 1978 (PURPA). While the passage of PURPA in 1978 provided a major impetus for cogeneration development in the US, EPRI's involvement in cogeneration research dates back to 1977. Until that time, much of the research on cogeneration had focused on cogeneration systems owned and operated by industry, with insufficient attention on the potential utility roles, perspectives and impacts. In particular, the feasibility and benefits of cooperative efforts among industry and utilities had not been studied. Recognizing the important of cogeneration from the utility perspective, EPRI initiated a major cogeneration project (RP1276) in 1978. The objectives of EPRI cogeneration research are discussed.

47693 (EPRI-EM—5285, pp 21.1-21.7) **Electric alternatives to packaged cogeneration.** Blatt, M.H. Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

The economics of packaged cogeneration systems are characterized for selected building application and a range of electric gas price differences. It was found that comparisons made by developers and promoters of cogeneration systems considered low cost, low efficiency electric options in the comparison. The comparison made on this basis showed attractive economics for cogeneration systems for high electric-to-gas price differences in many of the applications studied. The favorable applications were situations where the cogenerator was sized for baseload electrical and thermal energy requirements, i.e., where the cogeneration system could be used continuously throughout the year. The sample situations that make cogeneration attractive, i.e., high utilization rates and high electric to gas price differences make high-efficiency electric alternatives attractive. A comparison of cogeneration economics is presented.

47694 (EPRI-EM—5285, pp 22.1-22.8) **Reference guide to small cogeneration systems for utilities.** Rodden, R. (RMR Associates, Palo Alto, CA). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

The principal objective of this project is to provide systems performance and cost data for selected smaller cogeneration systems, which are defined generally as those cogeneration systems in the zero to 5 megawatt range. The data presented are expected to be used in two main ways. First, the data can be used to extend the existing DEUS Computer Evaluation Model data base to the smaller cogeneration systems. Second, the data will serve as a general guide to smaller cogeneration systems for use by the utility companies and others.

47695 (EPRI-EM—5285, pp 24.1-24.6) **New approaches to industrial development: energy-integrated industrial parks.** Sgamboti, C.; Weinberger, P. (United Technologies Research Center, Hartford, CT). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

Energy parks can supply industrial, commercial and even residential energy users with all of their electric and thermal needs from an integrated energy supply system. They offer the potential for providing total energy needs more efficiently and economically than conventional energy approaches. A two-year program, sponsored by the Electric Power Research Institute (EPRI), has gained valuable insight into the energy park development process and has produced useful analytic tools for assessing project feasibility. These tools, successfully applied to five distinctly different utility sites, have been documented in an Energy Park Assessment Guide and an IBM PC-compatible software package to allow utility planners to make direct use of this new methodology. The feasibility of the energy park approach to cogeneration is discussed.

47696 (EPRI-EM—5285, pp 23.1-23.15) **Cogeneration for industrial and mixed-use parks: Research Project 1276-19.** Minicucci, D.D. (Impell Corp., Walnut Creek, CA). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920505. (CONF-8610300—).

From EPRI cogeneration symposium; Washington, DC, USA (14 Oct 1986).

The purpose of this EPRI-sponsored research project was to assist utility personnel in identifying existing or planned mixed-use and industrial parks as potential cogeneration plant sites. Mixed-use and industrial parks are multiple building developments which include uses such as office, residential, retail, manufacturing, etc. Cogeneration can provide substantial benefits for park owners and tenants and the servicing electricity utility. These include reduced energy costs and increased reliability for park tenants as well as peak load shaving and load-located generation for utilities. Utilities can also share in the economic benefits of cogeneration through partial or total ownership. This project developed a process for evaluating the potential of a given site for cogeneration. The process involves a set of screenings, based on selection criteria and some basic analyses, to identify sites which have the highest likelihood of supporting a successful cogeneration project. A key element of this project was to test the process developed for an actual industrial park site and, based on the findings, prepare a handbook that utilities can distribute to industrial park owners/developers to encourage them to consider cogeneration.

47697 **(KTM/E-B—57) Cooperation in the energy field between industry and population centers.** Kotakorpi, J.; Salminen, P. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). May 1986. 53p. (In Finnish). NTIS (US Sales Only), PC A04. File Number DE87753323.

The objective of this study is to find out the cooperation in the energy field between industry and population centres in Finland. Emphasis in the study is put on the heat supply of industrial plants to population centres. The opposite case, that is, the heat supply of population centres to industrial plants is not included in the scope of the study. The study shows that the additional potential is possible by expanding the present cooperation. For example plants to be designed and jointly owned by the industry and population centres are already being planned in some population centres. Example partners were selected in each cooperation sector and the reasons for starting the cooperation, the technical solutions and costs were examined. Setting the price of heat and making the heat supply contracts were also investigated. On the basis of the example partners it was possible to work out a general instruction about how to start cooperation in the energy field. The basis for starting cooperation is the fact that both parties will benefit benefit from it. In addition to economical profits, the cooperation can lead to other considerable benefits as well. When calculating the costs it is important to take into account the contributions from the society, which may greatly affect on the total costs of the project. The most significant energy economical profits will be gained when it is possible to exploit the heat load of the population cenre in the existing industrial back pressure plants or by building new back pressure power plants based on the heat load of the both parties. In cooperation it is possible to exploit domestic fuels for the heat load of even small population centres by producing the energy in industrial boilers.

47698 **(NEI-FI—6) Effect of new cooking methods on the optimization of the energy consumption of the sulphate pulp mill.** Oestman, H.; Fagerstroem, P. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). Dec 1986. 59p. (In Finnish). (KTM-TS—55312). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753337.

The report studies the effect of new energy saving cooking methods on the energy consumption and generation of the whole sulphate pulp mill. The report deals with energy saving and its utilization, the need of investment and the profitability of the methods by taking into account the energy generation and the consumption structure of the mill. Profitability analysis of the mehtods also takes

into account the changes in wood raw material, chemicals and environment protection costs. By new cooking methods it is possible to achieve significant saving, even up to 70%, in the primary steam consumption of the cooking compared with the conventional batch cooking. In the process steam consumption of the whole mill this means even 20% saving. In the best case this means a fuel saving of about 80 kg oil/tp, but in that case the backpressure power generation is reduced by about 130 kWh/tp. On the present energy price level (August 1986) the net saving is FIM 27/tp and the annuity of the investment will be at the most 9%/a. The present energy price level as such does not make investment in conversion of energy saving cooking methods economical. The new cooking methods would be economical if they, in addition to energy saving, had also other operational benefits.

47699 **(NEI-FI—13) Meaning of wastepaper use in the energy economy of newsprint production.** Joro, E.; Kommonen, F.; Jarva, K. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 18 Dec 1986. 49p. (In Finnish). (KTM-TP—65304-05). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753336.

The meaning of wastepaper in the energy economy of newsprint production was studied by using a mill model in which one modern paper machine produces 180,000t/a of paper using alternatively grinding, pressurized grinding or thermo-mechanical pulping in mechanical pulp production. A part of the mechanical pulp production capacity is intended to be replaced by a deinked pulp plant integrated in the paper mill. By using a computer based method energy balances were calculated and a preliminary profitability evaluation was made. Substituting mechanical pulp by deinked pulp (DIP) reduces the amount of purchased power but increases the use of purchased fuels. However, the total effect is energy saving. In the model the amount of DIP was assumed to correspond to 1/3 of the fiber consumption of the paper machine in which case the energy saving per mill would be as below: Groundwood (SGW) is replaced by DIP: 7,700 toe/a; PGW is replaced by DIP: 10,300 toe/a; MP is replaced by DIP: 16,100 toe/a. The use of deinked pulp increases the amounts of chemicals and other operation materials supplied to the paper mill. Transportation of the above materials and raw materials will also increase. Taking into account the amount of direct energy (electricity and fuels) the Finnish industry spends on this, and the reduction in wood transportation the above saving figures fall to the following figures: SGW alternative: 6,200 toe/a; PGW alternative: 8,800 toe/a; TMP alternative: 14,800 toe/a. The quality of wastepaper and deinked pulp made from it has a great effect on the runnability of a paper machine and through that also on energy consumption and the profitability of the total investment.

47700 **(NEI-FI—19) Use of natural gas diesel engines in mechanical pulp production. A prelimminary study.** Niemi, A.; Maaskola, K. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1986. 48p. (In Finnish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753065.

Mechanical pulp production increases all the time which causes growth in electric power demand. The growth cold be reduced by using dual fuel engines i.e. gas-diesel engines that use light fuel oil for ignition instead of electric engines. Mechanical powers and shaftspeeds of gas-diesel engines researched in this feasibility study are quite suitable - ratios of required gears are rather low. Gas-diesel engines may be mechanically suitable power sources at both TMP and PGW production. The profitability of the use of diesel engines for a single company depends very much on the prices of electricity and natural gas, and whether they have use for waste heat available from intercooling of combustion air, cylinder cooling water and lubrication oil cooling. The potential capacity of gas-diesel motor driven production of mechanical pulp will be 405 000-855 000 t/a by the year 2000, which would mean a decrease of 120-250 MW in the growth of electric power demand. The increase in mechanical power demand would correspondingly be 370-770 million FIM cheaper when using gas-diesel motors than if a coal power plant would be built and electric motors installed. The use of gas-diesel motors would decrease the rise in raw energy consumption by 0.2-0.9% of the total energy consumption in Finland in 1985. The imports of hard coal would decrease by 6-13%, the imports of natural gas would increase by 14-30%, and the use of light fuel oil would increase by 1.2-2.5%, compared with the import statistics of the year 1985.

47701 **(NEI-FI—25) Use of domestic fuels in kraft pulp mill lime kilns.** Pusa, R.; Salin, J.-G. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 20 Mar 1987. 183p. (In Finnish). (KTM-TK—45173-01). NTIS (US Sales Only), PC A09/MF A01. File Number DE87753333.

The objective of this investigation was to study the substitution of oil in kraft pulp mill lime kilns by domestic fuels such as bark, wood residues or peat. Two noteworthy methods for the exploitation of biofuels have been tested: fuel drying, grinding and combustion as pulver; and fuel drying, coarse grinding, gasification and combustion as gas in the rotary lime kiln. With these methods practically all the oil can be replaced, provided that the fuel is dried to 85-90% dry solids content. With pulverized fuel the undesirable elements, especially aluminum and silicon, are almost completely transferred to the lime and further to the liquor cycle. Bark-free wood may normally be used. When biofuel is gasified almost the whole amount (90%) of these elements will leave the process with ash from the gasifier and wood and bark can be used without limitations. Peat contains such high amounts of these elements that the use of pulverized fuel is out of the question and with gasification there may also be problems. Lime kiln capacity can be increased by oxygen enrichment but, due to some difficulties, the specific energy consumption could not essentially be improved. A pulp mill that is not integrated has normally a surplus of bark which is sufficient for a complete replacement of lime kiln oil. The investment payback time is both for the pulverized fuel and the gasified fuel alternative about 3.5 years. If the surplus bark can be used in other ways the investment is not usually profitable. Combustion of domestic solid fuels in the lime kiln is technically competely feasible. However, with present energy prices such an utilization is possible only in rather few cases.

47702 **(PB—87-207932/XAB) Energy conservation and the provision of optimum-temperature conditions for intensive livestock. Technical report series.** Bolla, G. (Australian Agricultural Council, Canberra. Standing Committee on Agriculture). 1986. 65p. (SCA/TRS—17). NTIS, PC PC E04/MF E04.

The report examines the nature and systems of pig and poultry housing currently in use on commercial farms in Australia. These intensive livestock industries are located in diverse production centers throughout Australia, often experiencing extremes in ambient temperatures ranging from -5°C to +45°C. The report indicates that the majority of pig and poultry houses are unable to control internal environments within the optimum range of temperatures outlined in the report. It outlines what is required to improve pig and poultry environments and examines current and proposed advisory and research projects to overcome present housing and related management deficiencies.

47703 **(PB—87-215950/XAB) Field test of a ceramic heat-recovery system for an aluminum reverberatory furnace. Final report, November 1984-December 1986.** Ward, M.E.; Gildersleeve, R.E. (Solar Turbines, Inc., San Diego, CA (USA)). Apr 1987. 69p. (SR—87-R-5261-25). NTIS, PC A04/MF A01.

See also PB—86-201068.

The objective of the project is to provide reliable and cost-effective heat recovery in a moderately corrosive flue-gas environment of an aluminum reverberatory-type remelt furnace. This was accomplished through field-testing a full-scale modular ceramic-tube heat exchanger on a production furnace. Separate materials testing was completed in addition to the full-scale recuperator testing in order to support possible application of this recuperator design to even-more corrosive environments.

47704 **(PNL-SA—15218) Turning over new ground: An impact evaluation of an irrigated agriculture program.** Keating, K.M.; Harrer, B.J.; Tawil, J.J. (Bonneville Power Administration, Portland, OR (USA); Pacific Northwest Lab., Richland, WA (USA)). Aug 1987. Contract AC06-76RL01830. 11p. (CONF-870811—8). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000077.

From Energy conservation program evaluation: practical methods and useful results; Chicago, IL, USA (19 Aug 1987).

The Bonneville Power Administration (Bonneville) operates an electricity conservation program for the irrigated agriculture sector in the Pacific Northwest. This paper briefly describes the program, the problems involved in evaluating the program, evaluation, and results. Bonneville found that robust energy consumption models can be specified, that the methods used to prredict energy savings based on physical measurements of pump horse power reductions are accurate and reliable, and that the program is cost-effective to Bonneville and the region.

47705 **(STEV-FBT—87-2) Investigation concerning organic micro-pollutants from waste combustion.** Bergstroem, J.; Oeberg, T. (Statens Energiverk, Stockholm (Sweden); Miljoekorsulterna i Studsvik AB, Nykoeping (Sweden)). Apr 1986. 52p. (In Swedish). (MKS—86-26). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753112.

The goal of the assignment is to provide a basis for evaluating the influence of the operational condition on the release of organic compounds and nitrous oxides from waste incineration. The measurements taken in Borlaenge show that an optimization of incineration by reducing the O/sub2/ content in the flue gas and raising the energy density in the furnace can reduce the release of nitrous oxides by half. Waste incineration in all Swedish plants is combined with energy production. The resulting energy is used for district heating in most cases. The systems for flue gas condensation which are now being introduced into Sweden aim to increase energy recovery without increasing fuel consumption. Less than 2 percent of the organic substance in the waste leaves the furnace with slag and fly ash. More than 99.5 percent of amount of burnt waste oxidizes into carbon dioxide and water. The quantity of non-oxidized gases which leaves the furnace along with the flue gas mainly consists of carbon monoxide and the same type of light hydrocarbons that occur with all incineration. Waste incineration is notable, in comparison with wood fuel firing, for its essentially higher chlorine content. About 75 percent of the chlorine is the fuel occurs as hydrochloric acid in flue gas. Less than one pro mille of the chlorine produces chlorinated aromatics.

47706 **(STU-I—475-1985) Energy use by SCA-Nordliner at Munksund.** Nord, B., Dahlen, G. (Swedish National Board for Technical Development, Stockholm). 1985. 78p. (In Swedish). NTIS (US Sales Only), PC A05/MF A01. File Number DE87753352.

A detailed description of energy consuming units is presented. Principal diagrams show inputs and outputs. Energy balances are given as Sankey diagrams where the flows are presented as kWh per ton produced pulp. Total energy flows are also shown and compared with earlier recordings from 1979. Differences are discussed. (G.B.).

47707 **Hazardous waste management strategy in Illinois: Government's role.** Barcelona, M.J.; Changnon, S.A. Jr. (Hazardous Waste Research and Information Center, Water Survey Div., Illinois Dept. of Energy and Natural Resources, P.O. Box 5050, Station A, Champaign, IL 61820). pp 510-520 of Proceedings of the international conference on new frontiers for hazardous waste management. Cincinnati, OH; Environmental Protection Agency (US) (1985). (CONF-850960—).

From International conference on new frontiers for hazardous waste management; Pittsburgh, PA, USA (15 Sep 1985).

EPA/600/9-85/025.

State government bodies, in particular, are in a position to stimulate the adoption of waste reduction, resource recovery and alternative treatment practices, as well as to discourage the continued use of land disposal waste management options. The experience in Illinois clearly demonstrates that the Department of Energy and Natural Resources, as a nonregulatory agency, is a good venue for the promotion of safer waste management options. A balanced program of research, information transfer and industrial assistance has been established to coordinate the development of a statewide hazardous waste management policy. Industrial, academic and public interest groups are involved as contributors to this effort which supplements ongoing activities on hazardous waste problem solving in other states and at federal institutions.

3206 Municipalities And Community Systems

REFER ALSO TO CITATION(S) 47264, 47323, 47697, 47707

47708 **(BFR-R—18-1986) District heating economy based on true total costs.** Joensson, T. (Swedish Council for Building Research, Stockholm). 1986. 85p. (In Swedish). NTIS (US Sales Only), PC A05. File Number DE87753090.

In this report Swedish district heating systems are discussed from an economic efficiency point of view. Based on statistics and accounts from 32 Swedish district heating systems of varying sizes (40-800 MW) during eights years (1976-83) the cost structure and the true total cost, which should be reflected in the consumer tariff, are investigated. Especially examined are possible monetary transfers between the district heating business and the local authority. These are shown related to various principles for calculation of true costs for capital and service supplied by the local authority as well as methods to render accounts there seems to be scope for monetary transfers above true heat services costs amounting to 5.10 percent of the total turnover. This percentage has shown a tendency to increase in later years, especially among new district heating systems and systems with CHP-plants. A major part of these monetary transfers are due to overdepreciation e.g. by double inflationary protection or by putting shorter depreciation-times than originally planned for into practice. More homogenous accounting principles among district heating organizations would be required to make a better basis for efficiency comparisons and for assertive statements on issues dealt with in the report.

47709 **(DOE/CE/26520—T2) Aquifer thermal energy storage district cooling in downtown St. Paul, Minnesota: Feasibility study.** (Saint Paul District Heating Development Co., MN (USA)). Sep 1986. Contract FG01-85CE26520. 161p. NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE87014985.

Potential district cooling customers currently incur relatively low costs for cooling. Very little opportunity exists for district cooling to provide economic benefits by enabling customers to avoid capital expenditures for chilling systems. As an overall average, buildings are using an estimated 60% of the capacity of the installed chillers. The Prairie du Chien-Jordan aquifer is the most cost-effective aquifer for chilled water storage, but it is also the most heavily used aquifer in downtown St. Paul, so aquifer storage may interfere with other wells. Well interference can be minimized by placing storage wells near the Mississippi River. Daily chilled water storage can reduce storage well costs, in addition to increasing operational flexibility. Discharge water from existing winter heat pump operations can economically be used as the source water for winter chilling. Water chilling using ambient winter air can be done by cooling a brine in a cooling tower and then chilling water via a heat exchanger. Use of the steam pipes and tunnels can significantly reduce distribution system costs. However, there are significant legal barriers to access to the steam tunnels, and potential legal liabilities related to asbestos insulation. Although ATES can be cost-competitive compared to installing new chiller systems, ATES district cooling in the study area is not economically feasible.

47710 **(NEI-FI—20) Natural gas driven heat pump in district heating.** Junttila, V. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). Mar 1987. 152p. (In Finnish). NTIS (US Sales Only), PC A08/MF A01. File Number DE87753066.

The goal of the project was to find a suitable place in Finland for an economic and technically functioning natural gas driven heat pump plant. Investment costs of a heat pump plant were inquired from several heat pump and gas engine suppliers. Operating

costs were calculated. Calculations which were made according to the initial tenders showed that the co-generation alternative was so profitable that it was included as a standard option to the final invitation of tenders. Absorption heat pump seemed to be the most economic solution for glass factory's purposes: Output 3.5 MW, input 1.9 MW, cooling effect 1.83 MW, investment costs 1.63 million FIM. The greatest disadvantage of the absorption heat pump is that electricity cannot be generated with it. It was estimated that with the oil price of at least 20 dollars/barrel the heat pump heating energy could be valued at 45 FIM/MWh thus making the absorption heat pump solution economic. When the research project was started in spring 1985 the oil price was 25 dollars/barrel. In the future the glass factory is prepared to connect its new production process to a heat pump cooling system. It is very difficult to estimate the potential of the economical natural gas driven heat pumps in Finland because of so many variables affecting the calculations: energy prices, temperature levels, effect levels, distance etc. Calculation should always be made case by case and generalizations should be avoided.

47711 **(STU—85-4625) Heat recovery from flue gases at a bark fired boiler using a steam producing heat pump.** Nygaard, J.; Martinsson, C. (Swedish National Board for Technical Development, Stockholm). 9 Apr 1986. 26p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753351.

In order to efficiently use the heat recovered in a flue gas condensation system of a bark fired boiler at a paper mill, a heat pump system using methanol as working fluid suggested. By using methanol instead of e.g. R114 low pressure steam can be produced directly, i.e. a steam compressor needs not to be installed. Cost estimates are given for the installation. (L.E.).

47712 **(SVF—237) Maintenance planning in district heating system.** Asp, T.; Eriksson, A.; Danielsson, H.; Haard, S.; Wiktoren, B. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden)). Aug 1986. 132p. (In Swedish). NTIS (US Sales Only), PC A07. File Number DE87753098.

VIAK AB has on behalf of Stiftelsen foer Vaermeteknisk forskning and the district heating company in Gothenburg developed a computer aided system for maintenance planning in district heating net. The results of this work are presented in this report and in form of software called FV-Rebus. The net is divided into lines and chambers and each part is given a unique name or number. Technical information as well as local conditions will be programmed and also information from the normal supervision. The planning part is divided into Supervision, Planning and Follow up. All planned jobs are programmed under each sector of the net. Every job is documented, like costs, cause and type of repair method. All kinds of research can easily be done by the user. The locations of a specific type of valve, the maintenance costs for a specific area, etc can be produced as the user wishes.

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS

3301 Internal Combustion Engines

REFER ALSO TO CITATION(S) 47876, 48089

47713 **(DOE/ER/10743—1) Piston ring friction and vehicle fuel economy: Final report, November 1, 1983-January 31, 1987.** Hoult, D.P. (Massachusetts Inst. of Tech., Cambridge (USA). Sloan Automotive Engine Lab.). Aug 1987. Contract AC02-80ER10743. 31p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014536.

This project has involved three major tasks. They are: (1) The measurement of the transition of a piston ring, in a running engine, as it moves from the bottom to the top of the groove in the piston. (2) A theoretical analysis of the dynamics of a single piston ring. (3) The setup and calibration of a laser fluorescence measurement technique for oil film thickness measurements. Highlights of the results are (a) the discovery of a gas lubricated piston ring design, which holds promise for substantial reduction in piston ring friction, and successful operation at high temperatures; (b) the application of the quantum mechanical principals necessary to correctly calibrate the dewet-fluorescence technique in a running engine.

47714 **(DOE/ET/15397—T6-Vol.1) Numerical simulation of internal combustion engine flows: Development and users guide for MAGIC radial-azimuthal version.** Hsiao, C.C.; Su, F.Y.; Traci, R.M. (Science Applications International Corp., San Diego, CA (USA)). Apr 1987. Contract AC04-79ET15397. 45p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014453.

Although the physical modelling approaches presented are based on the well-established methods used in MAGIC, it was decided to implement a more current and potentially flexible set of numerical model approaches in MAGIC-RT. Thus, the computer code described in this report is entirely new and as a result required its own testing and validation studies that have occupied the bulk of the effort to date. As a result, the present report is divided into two main technical sections: Section 2, which described the methods and models utilized in MAGIC-RT, and Section 3, which summarizes the test case calculations performed to date. Finally, Section 4 provides a preliminary User's Guide for MAGIC-RT, which could permit an experienced numerical analyst to use the program.

47715 **(ORNL/TM—10485) Results from the first year of operation of the Federal Methanol Fleet at Lawrence Berkeley Laboratory.** McGill, R.N.; Hillis, S.L.; Wantland, J.L. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 40p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000018.

The Oak Ridge National Laboratory (ORNL), under the auspices of the Alternative Fuels Utilization Program, has been managing the Federal Methanol Fleet Project since its beginning in fiscal year 1985. This congressionally mandated project directed the Department of Energy to begin to implement methanol-fueled vehicles into civilian government fleet operations. This interim report describes the first year's operations. This interim report describes the first year's operation of the methanol fleet activities at Lawrence Berkeley Laboratory (LBL) in Berkeley, California. Operation of methanol cars at LBL officially began on November 1, 1985. The fleet consists of five 1984 methanol-fueled Chevrolet Citation sedans paired with five analogous gasoline-fueled Citations for comparison. Data have been collected and tabulated on fuel consumption, maintenance records, driver perceptions of operability and safety, and oil sample analyses. Although drivers have expressed some concerns regarding the off-site availability of methanol fuel, they generally reported no significant differences in their perceptions of safety and operability between the methanol and gasoline vehicles. No major maintenance problems were encountered. Oil sample analyses revealed higher engine wear rates in the methanol vehicles, but not alarmingly high. These results are in agreement with those obtained from other methanol fleets. It is concluded that the Federal Methanol Fleet operation at LBL has been highly successful during its first year of operation.

47716 **(PB—87-215703/XAB) Endurance testing of a natural-gas-fueled rotary engine. Final report, March 1985-January 1987.** King, S.R. (Southwest Research Inst., San Antonio, TX (USA)). Jan 1987. 98p. (SWRI—8516). NTIS, PC A05/MF A01.

See also report for Mar 1985-Feb 1986, PB—86-203346.

Endurance testing was conducted on production automotive-type Mazda 13B rotary engines converted for operation on natural gas. Through regular scheduled teardown inspections, wear data were gathered on critical engine components and used to develop component wear trends over 6000 hours of engine operation. Wear trends were used to predict the usable life of the engine before requiring a major rebuild. The engines were operated at the steady-state conditions of 4000 rpm/52 brake horsepower. An average thermal efficiency of 26% was obtained at 400 rpm wide-open-throttle conditions. Results indicate apex-seal wear rates and trochoid-surface wear rates low enough to achieve 20,000 hours of engine operation. Based on wear predictions, the limiting factors for durability appear to be the main and rotor bearings and the side-seal end-gap clearance. A crankcase oil-pump failure resulted

in a premature failure of the main bearings and damage to other high-load components. In spite of the failure, durability tests indicate favorable results for use of rotary engines in prime-mover applications.

3303 Electric-powered Systems

47717 (CONF-8610122—, pp 4-6) **Overview of the US Government's Electric Vehicle Program.** Brown, P.J. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The US Government's Electric and Hybrid Vehicle Program is divided into four major program areas: (1) battery research and development, (2) propulsion system development, (3) test and evaluation, and (4) studies and assessments. This overview describes the progress and status of the technology development of six battery couples (lead-acid, nickel-iron, sodium-sulfur, nickel-cadmium, iron-air, and zinc-bromine). The status of the development of two major a.c. propulsion systems by Ford Motor Company and the Eaton Corporation is given. The testing and evaluation activities both in the laboratory and in fleet operations are described including the product improvements by the Site Operators' User Task Force. The results of the Advanced Vehicle Systems Assessment and the Hybrid Vehicle Technology Assessment are reviewed.

47718 (CONF-8610122—, pp 7-19) **Electric and hybrid vehicles status and development in Europe, by A.V.E.R.E.** Brusaglino, G. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Research and development activities and practical operation programs have made available technologies for EHVs capable to satisfy the operational requirements of various application sectors. The achievements are the results of coordinated efforts of vehicle and component manufacturers, electricity producers, fleet operators, Public Authorities and the support of the European Community. The situation in the various European Countries is described in terms of technology, types of vehicles, as well as new trends, studies and solutions presently under development.

47719 (CONF-8610122—, pp 20-24) **State of the art and overview on R and D and demonstration for EHV in Japan.** Akikawa, Y. (Japan Electric Vehicle Association, Tokyo). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Electric vehicle research, development and demonstration activities in Japan and on future issues and directions are reported. EVs are being researched and developed in Japan to meet society's requirements today for both energy efficiency and pollution prevention. EV R & D work and demonstrations are being carried out by private enterprise in joint cooperation with the Japan Electric Vehicle Association and Electric Vehicle Engineering and Research Association, under the direction of the Electric Vehicle Council of Japan, an advisory body to MITI. Some R & D programs have also been implemented on the initiative of private companies. JEVA's activities form the nucleus of the EV R & D and demonstration efforts of Japan. Popularization of EVs depends largely on society's concern about environmental preservation, energy supplies, energy demand trends and other socio-economic circumstances. However, the primary factors that hold the definite key to EV popularization are the economy and performance of EVs. Future EV R & D work and demonstration activities should be planned and carried out such that the requirements for both factors are met.

47720 (CONF-8610122—, pp 25-30) **Electric vehicle research at EPRI.** O'Connell, L.G. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The success of future electric vehicles will be determined in the market place. The Electric Transportation (ET) Program at the Electric Power Research Institute (EPRI) is developing component entry and subsystems for electric vehicles which will fill particular market niches. Studies are conducted to establish the market potential of electric vehicles as a function of their performance capability. The EPRI ET Program consists of three major project sections; battery systems development, vehicle systems development, and advanced transportation systems development. The current planned contribution of each section to improved electric vehicles is discussed.

47721 (CONF-8610122—, pp 31-36) **EVDC Van Demonstration Project.** Mader, G.H.; Bevilacqua, O.M. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The scope and status of the Electric Vehicle Development Corporation (EVDC) Van Demonstration Project are reviewed. This project is the first private-sector effort to introduce a commercially manufactured electric van into North American service fleets. The focus of this study is Phase 2 (Field Evaluation and Infrastructure Development). Key operational data are summarized, and ways to increase the GRIFFON's market acceptability are discussed. Vehicle support systems and efforts by utilities to promote the use of GRIFFONs in commercial vehicle fleets are also described. Phase 3 (Van Deployment) and Phase 4 (Technology Transfer) targets are also covered.

47722 (CONF-8610122—, pp 37-43) **Temperature effects on nickel/iron battery characteristics.** DeLuca, W.H.; Tummillo, A.F.; Biwer, R.L.; Hornstra, F.; Christianson, C.C. (Argonne National Lab., IL). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The performance of an improved Ni/Fe electric vehicle battery applications was measured at ambient temperatures of 0, 25 and 50°C for a range of overcharge levels (3-80%), open-circuit stand times (0-4 h), and charge (1-6 h) and discharge (1-3 h) rates. Charges and discharges were also performed at different battery operating temperatures to differentiate the effects of temperature on battery charge acceptance and available discharge capacity. The results show that the discharge capacity increases with an increase in the operating temperature, but that the charge acceptance is maximal at 25°C. To maintain the same Ah capacity achieved at 25°C with a 20% overcharge, the overcharge must be doubled at 50°C (42%) and tripled at 0°C (60%), with a concomitant increase in water consumption and gassing. The charge acceptance is decreased at high temperatures because of increased self-discharge losses. The self-discharge rate in the first 0.5 h after charging is increased from ~8 to 16 A for a 25 to 50°C increase in temperature. The increased self-discharge rate is also present during the latter part of charging and, thereby, causes (1) a 6% decline in charge acceptance for a 25 to 50°C increase in charge temperature, and (2) a 6% decrease in a Ah efficiency at 50°C when the charge current is reduced (from a 3-h to 6-h rate). To obtain maximum energy efficiency, the optimal charge rate is dependent on the battery temperature. In addition, low temperatures have a significant impact on battery internal resistance and IR-free voltage. For a decrease in ambient temperature from 25 to 0°C, a 2.3% decrease in the IR-free voltage and about a 22% increase in resistance resulted. A a single IR-free voltage vs. DOD waveform was developed that could be applied in a simplified battery model to determine and display battery DOD level as an effective electric-vehicle fuel gauge.

47723 (CONF-8610122—, pp 44-47) **Design and performance of the NIF-170-5 nickel iron battery.** Gentry, K. (Eagle-Picher Industries, Inc., Joplin, MO). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The design, fabrication and performance of the Eagle-Picher NIF-170-5 nickel iron electric vehicle propulsion battery is presented. This work was performed in support of the US Department of Energy funded Advanced Dual Shaft Electric Propulsion (DSEP) System Technology Development Program. Features addressed in this specific design include high power/energy ratio by reducing cell impedance, improved packaging with commercial heat sealing

techniques, optimizing performance and charging characteristics for electric vehicle mission and addressing the manufacturing techniques and processes for moderate production rates. Test data for various discharge profiles including the FUDS for the DSEP test bed vehicle are presented.

47724 (CONF-8610122—, pp 48-52) **Worldwide nickel/iron battery development for electric vehicle applications.** Patil, P.G.; Walsh, W.J.; Miller, J.F. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Worldwide efforts to develop Ni/Fe batteries for EV applications are summarized. Research, development, and testing activities in the US, France, West Germany, Sweden, Czechoslovakia, Russia, Taiwan and Japan are described. Recent technology advances are discussed, and the present state-of-the-art capability is summarized. Advanced Ni/Fe batteries have exhibited good performance and a service life of 50,000 to 100,000 miles is expected by most developers. Ni/Fe batteries have been tested extensively in electric vehicles in the USA, Japan, Western Europe, and the USSR with generally good results. The present R & D directions of the various developers are described.

47725 (CONF-8610122—, pp 53-55) **New stabilized long cycle life nickel-zinc battery system for E.V.'s.** Eisenberg, M. (Electrochimica Corp., Menlo Park, CA). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Through a basic modification of the chemistry of the zinc anode a new stabilized version of the nickel oxide-zinc battery system has been developed for potential applications in electric vehicles. This modification substantially reduces the well-known problems of dendrite shorting, shape change and plate densification. The result has been a major enhancement of the cycle life capability to a level of 600-800 cycles with a 50-60% retention of the original capacity. Tests conducted on 225 AH capacity, nickel-zinc cells, control groups were used for the sake of comparison. The new chemistry cells delivered 600-800 cycles compared to 95-200 cycles for conventional cells which usually failed by shorting. The new chemistry battery system provides the opportunity to achieve and exceed an economic goal of at least 500 cycles and provide an operating distance of at least 160 kilometers.

47726 (CONF-8610122—, pp 56-56) **Ni-Zn battery.** Bronoel, G.; Breting, O. (Seregie, Rueil Malmaison, France). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Three research years were devoted to the experimentation and development on a range of SEREGIE Ni-Zn secondary batteries whose technical and economical data performed are satisfying. The SEREGIE Ni-Zn secondary battery is characterized by: electrolyte moving along channels, and containing dissolved zincates; charge current of battery is pulsed, following an accurate timing; both the latter features make smooth and plain the zinc deposit on negative electrode during charging time; and series connections for each set of elementary cells are achieved by use of bipolar collector.

47727 (CONF-8610122—, pp 59-65) **Nickel-cadmium battery for electric vehicles.** Glenn, D.; Viswanathan, S. (Energy Research Corp., Danbury, CT). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The processing steps in the preparation of roll-bonded electrodes developed at ERC (US Patent #3,898,099), their performance data and the trade-offs in the use of non-sintered electrodes are presented. A patented system to monitor the state of charge of batteries is also discussed. The energy densities and costs of the system along with relevant information on worldwide supply and demand of active materials and their cost impact are included.

47728 (CONF-8610122—, pp 66-74) **EV battery charger testing in the EPRI/TVA program.** Driggans, R.; O'Connell, L. (Tennessee Valley Authority, Chattanooga). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Testing has been completed by the Tennessee Valley Authority (TVA) on four electric vehicle traction battery chargers: the Philips Model PE 1701, Lester Model 9865, Hoppecke Model E240G144/16, and Chloride Spegel S1P108/30. Chargers were evaluated on the basis of distortion caused to the input distribution system, input/output characteristics and operating efficiency, and interference with communications equipment while recharging a lead-acid battery pack. This testing is a cooperative effort with the Electric Power Research Institute (EPRI).

47729 (CONF-8610122—, pp 75-81) **Battery in-vehicle life testing at TVA.** Barnett, J.H.; Thomas, W.A.; Blickwedel, T.W. (Tennessee Valley Authority, Chattanooga, TN). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The Tennessee Valley Authority (TVA) has a field test activity to evaluate EV traction batteries. The purpose of this in-vehicle evaluation is to provide an impartial comparison of battery life and performance in a real world environment. Daily operation, monthly range on the track, and periodic static discharge test data are analyzed statistically with variable conditions normalized. Results are presented in life (cycles and miles) on each pack, specific energy versus vehicle accumulated miles, and driving range over fixed operating conditions (constant speed and SAE J227a C cycle). To date, lead-acid, gel cell, advanced lead-acid, nickel-iron, nickel-zinc, nickel-cadmium, and zinc chloride systems are being or have been tested.

47730 (CONF-8610122—, pp 82-97) **Two decades of high performance EV fleet experience.** Wouk, V. (Victor Wouk Associates, New York, NY). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The problem of air pollution caused by conventional road vehicles in the 1960's, encouraged efforts to build traffic-compatible battery-powered commercial vans and automobiles. Probably the first attempt to introduce high performance EVs was in the US in 1966, and then worldwide. It was recognized that in order to make the EV attractive commercially, the vehicles would have to be built in series, which required fleet operation. Unacceptable operational problems were encountered with the EVs from 1966 until the early 1980's. By 1986, operational problems in many cases have been reduced to routine maintenance, making EV fleets effective for their designed missions. Some of the programs relating to EV fleets built in the US, France, Germany, Italy, Japan and the UK are reviewed. The fleets include automobiles, work and delivery vans, trucks and buses. Reference is made to a fleet of hybrid electric buses. Operational problems that were encountered from the beginning included battery management, single-point watering, speed controllers, dc-dc converters and motor performance. Problems that surface during tests and in-use programs are discussed. Human factors contributing to operational problems are considered. The reliability of EVs has improved to the degree that today EVs are being offered for sale as a standard item. Success has been limited to work vehicles, delivery vans and other commercial applications, as opposed to passenger cars. Fleets of electric automobiles that are technically successful are also described. Some individual EVs have logged over 100,000 kilometers of operation, and some fleets more than 15 million kilometers.

47731 (CONF-8610122—, pp 98-102) **Electric vehicle technology progress in components on the road.** Dippold, W.J. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Looking back over 10 years, there is more progress in on-the-road-electric vehicles than is generally recognized by even the

current electric vehicle users. The best available vehicles in 1976 were either extremely heavy or had less than 20 miles range at low expressway speeds. Vehicles now in operation have improved motors, suspensions, aerodynamics, and more than double the 1976 range at full expressway speeds. Flooded battery systems have been made more convenient through single point watering systems and there is also a gelled electrolyte maintenance free battery available and under extensive test.

47732 (CONF-8610122—, pp 103-108) **EV technology: where we were, where we are and where we're going.** Barber, K.; Magro, W.R. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A methodology is presented for quantitatively tracing the progress that has been made in electric vehicle (EV) technology since 1978 (when the US DOE's site operator program began) and for forecasting how far EV technology has to go to be competitive with conventionally powered vehicles. In addition, the preliminary results of this methodology are presented. The study is based on operations, maintenance, reliability and cost data collected as part of DOE's private sector site operations program plus published results from EV technology status. Quantitative measures and trend lines of EV performance with respect to range, energy efficiency, maintenance, and reliability are presented.

47733 (CONF-8610122—, pp 118-121) **EV traction battery life under field conditions.** Kevala, R.J.; Tripp, M.W. (Booz, Allen & Hamilton, Bethesda, MD). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Lead-acid traction batteries commonly used in EVs exhibit shorter service life than can be expected from laboratory life cycle tests. Four years of operations with 24 EV conversions of VW Rabbit sedans by South Coast Technology have provided useful data on battery cycle life, capacity loss and mileage before failure. The effects of manufacturing variations, module location, trip length, and driver technique are analyzed. A trip length of 11 to 15 miles before charging was found to maximize battery cycle life as well as miles per module for this vehicle-battery combination.

47734 (CONF-8610122—, pp 122-128) **Development of electric vehicles in India by BHEL.** Dodeja, G.P.; Agarwal, B.H. (Bharat Heavy Electricals Ltd., Bhopal, India). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The concept of electric vehicles for road transportation dates back to latter part of 19th century. With rapid advances in IC engines by 1930's, the electric vehicles were virtually put into oblivion. Due to fast receding oil reserved and oil crisis of early seventies, the electric vehicles have taken a re-birth. In India, development of the electric vehicles was initiated by Bharat Heavy Electricals Limited, a leading public sector organization. The relevance of electric vehicles for a developing country like India, and BHEL's experience on design, development and operation of the electric vehicles are discussed.

47735 (CONF-8610122—, pp 129-135) **Recent Spanish development of electric buses.** Paster, J.I.; Egea, I.; de la Cruz, J.F.G. (A.D.V.E., Bilbao, Spain). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Electric Vehicles Development Association of Spain (ADVE) was founded in 1976 by all the electric utilities of Spain, and the most important makers of electric equipment. Besides other activities, ADVE has promoted and participated in electric vehicles projects of several types: urban car, delivery van, etc. The last prototype developed by ADVE is the compact bus ARCO IRIS. Since 1983, the bus ARCO IRIS is working, in normal commercial conditions, at the transport lines of several Spanish cities. Likewise, the ARCO IRIS has achieved its first export contracts, with the selling of a 20 bus series to Marrocco-Casablanca, expandable to 200 more units 5 years. Another ADVE project, initiated in 1986, is an urban electric bus prototype of large capacity and easy battery change (motor c.c., 100 kW, 220 V, 4.500 r.p.m.). This one includes a battery trailer, integrated in the body by means of shaft captive technology. Actually, ADVE is working in the Spanish National Program of Electric Vehicles development, conducting an extensive study of the world situation about electric vehicles development and experimentation, with the national plan on new electric technologies and energy diversification.

47736 (CONF-8610122—, pp 136-140) **Report on Hawaii's Electric Vehicle Research, Test & Evaluation Program.** Neill, D.R. (Univ. of Hawaii at Manoa, Honolulu). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Many factors make Hawaii the ideal location for utilization, research, test and evaluation of electric vehicles (EVs) and their various components. The results to date in HNEI's EV program are reported. Current efforts underway are a range extender program, a smart voltmeter/state-of-charge-meter, an on-board monitoring system, test and evaluation of advanced EVs, along with the research and development of renewable energy resources that can be used to charge electric vehicles. A new program initiated by HNEI in cooperation with the University of Hong Kong is an International Center for electric Vehicle Research, Test & Evaluation.

47737 (CONF-8610122—, pp 141-144) **Mathematical model of a lead-acid traction battery.** Jayne, M.G.; Morgan, C. (Polytechnic of Wales, Pontypridd, Mid.Glam.). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The results of detailed investigations into the behavior of lead-acid traction batteries when subjected to both steady and pulsed conditions of operation are presented. It is shown that high frequency pulsing of the batteries in both the charge and discharge modes can lead to temperature rise and an increase in the effective internal resistance of the cells. The results of these investigations and other investigations have been incorporated into a mathematical model of the battery which may be included in computer aided design (CAD) software packages, intelligent charging/discharge systems and state of charge indication metering systems.

47738 (CONF-8610122—, pp 145-150) **Effect of depth-of-discharge on lead-acid battery overcharge requirements.** DeLuca, W.H.; Tummillo, A.F.; Hornstra, F.; Christianson, C.C. (Argonne National Lab., IL). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

To develop an optimal charge procedure, an understanding is needed of the relation between battery available capacity, applied overcharge, and the depth-of-discharge (DOD) level prior to charging. Tests were conducted to measure the charge acceptance of EV-3000 improved lead-acid batteries (which use electrolyte mixing) and ALCO-2200 golf-car lead-acid batteries from initial DOD levels of 25, 50, 75 and 100%. The results show that the charge acceptance of both battery types rapidly declines to zero as a 100% state-of-charge (SOC) level is approached. The overcharge needed to attain the maximum available capacity from an EV-3000 battery is much less than that needed for an ALCO-2200 battery. For the EV-3000, an overcharge of 8% achieves full capacity from an initial 100% DOD level, and a reproducible 99.2% SOC is achievable with only a 6% overcharge from both 75% and 100% DOD conditions. The ALCO-2200 needed an overcharge of about 16% to achieve maximum capacity, but consistently achieved a 99.5% SOC with a 12% overcharge. Less overcharge was needed by the EV-3000 battery to attain maximum capacity from DOD levels of 25 and 50% than was needed from 100% DOD. The overcharge requirement for the ALCO-2200 battery was independent of DOD level. The acquired data, which relate capacity, overcharge, and DOD level, permit the definition of an optimum charge algorithm that ensures the achievement of full capacity without excessive overcharge. Applying only the minimum overcharge level

needed for full capacity minimizes battery outgassing, electrolyte water consumption, and maintenance.

47739 (CONF-8610122—, pp 151-156) **Capacity and peak power degradation of lead-acid battery under simulated electric vehicle operations.** Lee, J.; Tummillo, A.F.; Miller, J.F.; Hornstra, F.; Christianson, C.C. (Argonne National Lab., IL). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

In a program supported by the Electric Power Research Institute, controlled laboratory tests were conducted at Argonne to evaluate the effects of selected EV application factors on the performance and life of the EV-2300 lead-acid battery. These application factors included simulated driving profile discharges with different levels of peak power demands for vehicle acceleration, long rest times after charge or discharge, and different methods of recharging. The performance and life variations among cells and modules in a full-scale battery pack were also examined. Statistical methods were used to analyze the laboratory test data. The key factors affecting the performance and life of the battery were identified, and the rates of capacity and power degradation were quantified using multiple regression techniques. The analyses show that the most significant factors were peak power demand levels and cell location within the six-cell modules. The effects of charge method and rest times were found to be small.

47740 (CONF-8610122—, pp 157-165) **Battery charges since EVS-5, 1978.** Wilson, D.P. (Lester Electrical of Nebraska, Lincoln). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

An update is presented of 3-phase Ni-Fe chargers and microprocessor controller chargers for flooded electrolyte into immobilized electrolyte gel batteries and early adaptive charger indications. A discussion of the basic charger elements of battery efficiency and cycle life, some of which are still illusory, is presented.

47741 (CONF-8610122—, pp 166-171) **Development of a simplified driving cycle based on actual EV operations.** Dowgiallo, E.J.; Kevala, R.J. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The standard EV test procedure in use today are of value for comparisons between EVs on the same basis. They are not suitable for predicting the EV performance or range under actual field conditions. An important finding from this study is that for the actual EV operations tested, times spent in acceleration and deceleration are significantly longer than in cruise in all velocity bands. This is not the case for the SAE J227a test procedure. Due to this difference, the urban commuter mission required 21% less energy per mile than the SAE J227a Schedule C. Preliminary efforts at defining the important parameters of actual missions and their relationship to standard EV must procedures are discussed.

47742 (CONF-8610122—, pp 179-182) **Two-speed transaxle for AC powered light truck drivetrains.** Kalns, I. (Eaton Corp., Southfield, MI). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The subject experimental transaxle has been designed and developed at Eaton's Corporate R & D - Detroit Center under the DSEP (Dual Shaft Electric Propulsion) Program, an element of the overall US Department of Energy Electric and Hybrid Vehicle Program. Design objectives comprised meeting of basic specifications and incorporation of functional refinements of earlier designs. As part of the two-parallel-axes motor/transaxle assembly, the transaxle design features a unique planetary gear and clutch arrangement, along with the following distinguishing characteristics: high mechanical efficiency, high heat dissipation capability, flexibility in offering alternate ratios and in accepting different motor sizes, easy assembly, maintenance and component replacement, and low manufacturing cost. Experimental unit fabrication was performed at comparatively low cost by adapting most gear and clutch elements from production automatics. Dynamometer test results indicate efficiencies from 90 to 93% at half to full rated load throughout the operating speed range.

47743 (CONF-8610122—, pp 183-193) **GTO based inverter for a 60-kW variable reluctance motor drive for electric vehicle propulsion.** Torrey, D.A.; Lang, J.H. (Massachusetts Institute of Technology, Cambridge). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The design and evaluation of an inverter for a 60-kW variable reluctance motor drive for electric vehicle propulsion are presented. The inverter excites a bifilar variable reluctance motor during motoring and regenerative braking, and uses gate turn off thyristors for the controllable switches. The design tradeoffs between the motor and inverter are discussed, indicating how each influences the design of the other in an effort to optimize drive performance. Low power operation is studied experimentally, and high power operation is studied through numerical simulation.

47744 (CONF-8610122—, pp 194-197) **Electric drive system for the Chrysler T-115 van.** Angelis, J.; Hughson, E.A. (Brown, Boveri & Cie. AG Mannheim, West Germany). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

ADC electric drive system has been designed, installed, and tested in a Chrysler T-115 van. The components of the system include a 15 kW DC separately excited motor, an advanced electronic controller, and a impact, programmable, on-board charger. The vehicles were built and tested with Hagen 108V lead acid battery systems. One vehicle was subsequently retrofitted with a 112V sodium sulfur battery system and retested. The sodium sulfur battery demonstrated many significant advantages relating to vehicle range, performance at low states of charge, maintenance, and operational characteristics. At 56 km/h (35 mph), the lead acid powered vehicle achieved a range of 81 km, while the sodium sulfur vehicle achieved a range of 209 km. Both vehicles reached a top speed of 95 km/h and accelerated from 0-50 km/h in 16 seconds.

47745 (CONF-8610122—, pp 198-201) **System engineering in electric vehicle component research and development.** Ohba, S. (SOLEQ Corp., Chicago, IL). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

For the last seven years, SOLEQ maintained an electric vehicle component development program along with other on-going multiple product development programs in the authors small organization. The system engineering approach to product development activity has been essential from the viewpoint of maintaining system engineering effort, and also to justify the financial drain of an appropriate amount derived from the level of corresponding business activity. Earlier encounters and more exposure to technical problems shortened the feedback loop to correct equipment design flaws and incorrect manufacturing practices. One cycle of product development effort follows the preceding cycle pattern, and the next cycle might not be much different. Cycle timing may be reduced to the point where the ill effect of overlapping may surface. Product development effort has been viewed by levels from process, operation analysis, system analysis, system engineering, and system management.

47746 (CONF-8610122—, pp 202-208) **Methodology to assess the impact of driving schedules and drive train characteristics on electric vehicle range.** Hornstra, F.; Mulcahey, T.P.; Biwer, R.L.; Christianson, C.C.; Carothers, E.T.; Hogrefe, R.L.; Kulaga, J.E.; Webster, C.E. (Argonne National Lab., IL). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A methodology is described that combines the use of the battery Ragone (average power) and peak power characteristics, in a simple manner, to show which batteries and which drive train characteristics favor any one driving schedule over another, including the Federal Urban Driving Schedule (FUDS) and the SAE J227aD Urban Driving Schedule (SUDS). The methodology also reveals the energy remaining unused in the battery at the end of a discharge when the vehicle fails the requirements of the driving schedule. The additional range achievable by relaxing the discharge terminating requirements of the driving schedule for limp home can be determined. The methodology shows why batteries that have high peak power capability, while giving greater range, generally have less limp home ability.

47747 (CONF-8610122—, pp 209-214) **Comparative performance of an SCR- and a transistor-controlled electric vehicle.** Prans, G.; Chaya, J.H. Jr. (Manhattan College, Riverdale, NY). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A Cableform Pulsomatic MK-10 SCR controller and PMC-25 transistorized motor controller were tested in a 1980 Ford Fairmont station wagon EV. In sto-and-go driving they were compared using a microcomputer data acquisition system to monitor the battery power. On the highway they were compared using the average recharge energy required per mile. In city driving the PMC-25 saved about 21% in recharge energy per mile as compared with the MK-10. On the highway the PMC-25 saved about 12% in recharge energy per mile as compared with the MK-10.

47748 (CONF-8610122—, pp 215-218) **Onboard data acquisition system to monitor true average power.** Chaya, H.J. Jr.; Prans, G. (Manhattan College, Riverdale, NY). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

An onboard data acquisition system is described which uses an analog multiplier chip to obtain a true measurement of the electric power delivered by the battery in an EV when pulsed current is used.

47749 (CONF-8610122—, pp 248-257) **Roadway powered electric vehicle: an all-electric hybrid system.** Lechner, E.H.; Shladover, S.E. (Systems Control Technology, Inc., Palo Alto, CA). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The design and development of the roadway-powered electric vehicle (RPEV) are described. A hybrid system that includes an onboard energy storage device and a system for inductively transferring energy to the vehicle is discussed. How the RPEV system can provide a battery vehicle with essentially unlimited range, using as an example the design, development, and testing of a prototype electric bus system for Santa Barbara, CA is explained. The system design issues and trade-offs are explained, with particular emphasis on the energy budget that ensures a full day of vehicle operation. Results of testing of the prototype vehicle are used to demonstrate the feasibility of the technology, and future directions for the development of the RPEV technology are indicated.

47750 (CONF-8610122—, pp 258-267) **Inductive power transfer to an electric vehicle.** Lashkari, K.; Shladover, S.E.; Lechner, E.H. (Systems Control Technology, Inc., Palo Alto, CA). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The technology of the roadway powered electric vehicle (RPEV) system is described. In the RPEV, energy is transferred inductively from an inductor buried just beneath the road surface, across an airgap, to a vehicle which can be stationary or moving. The electrical characteristics to this unique electric vehicle system are explained in terms of an equivalent circuit model and phasor plots. The trade-offs, inherent in the design of the system are explained, and the performance of the system is described on the basis of both analytical predictions and results of testing the full-scale equipment. The ability of the system to transfer power from roadway to vehicle without mechanical contact is also demonstrated.

47751 (CONF-8610122—, pp 268-274) **Battery vehicle with hydraulic power buffer.** Johansson, M.; Ristborg, H. (Thoreb Corp., Goeteborg, Sweden). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The Swedish State Power Board and Thoreb Corporation are currently testing and developing a battery vehicle with a hydraulic power buffer. An ordinary battery powered van (Mercedes Benz 307 with gross weight 3500 kg) has been equipped with a system for protecting the battery from current peaks and for recovery of kinetic energy at braking. The main components of the system are a hydraulic pump/motor connected to the drive train and a hydraulic pressure accumulator. While braking, the hydraulic machine is used as a pump, pumping hydraulic oil to raise the pressure in the accumulator. This pressure is used to accelerate the vehicle when starting. When the pressure accumulator is empty, propulsion power is supplied by the electric motor. The main purpose of this system is to increase the driving range under city driving conditions and to improve the discharge conditions of the battery. One vehicle with this system has been built and the results from the field tests are very encouraging. The system is controlled by a microprocessor. This controls system also handles the speed regulation of the electric motor.

47752 (CONF-8610122—, pp 275-290) **C.N.R. - Fiat IVECO 471 BM trolleybus.** Mazzon, L.; Milani, P.G.; Brocchetti, G.; Brusaglino, G.; Roggero, A. (A.T.M., Milano, Italy). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A dual-mode trolley bus capable of operating on electricity supplied via overhead wire and independently under the power of a diesel engine, was developed from the IVECO 471 urban motor bus as project supported by the Italian National Research Council. Development was carried out under orders from A.T.M. (the Milan Transport Authority) by the Fiat Research Centre in collaboration with E. Marelli Trazione, end IVECO Bus Division. The basic concepts, the development of the vehicle, and the experimental results are discussed.

47753 (CONF-8610122—, pp 291-295) **Maintenance of electric vehicles at DOE sites.** Kevala, R.J.; Derr, K.E.; Barber, K.F. (Booz, Allen & Hamilton Inc., Bethesda, MD). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Four years of operating and maintenance data for 92 electric vehicles (EVs) operated at four US locations were analyzed. These vehicles and sites are representative of the majority of sites operating EVs under the US Department of Energy's Electric and Hybrid Vehicles Test and Evaluation Program. Corrective and preventive maintenance labor and part replacement data indicate that maintenance costs can be minimized by regular preventive maintenance of the traction battery. Newer technology drive trains and battery installations were also found to require less maintenance.

47754 (CONF-8610122—, pp 296-300) **G.M. Griffon van customer opinion research.** Stawski, J.W. (Detroit Edison Co., MI). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Results of G.M. Griffon electric van market research conducted by Detroit Edison among commercial customers in Edison's service area are presented. Detroit Edison has initiated a program to actively demonstrate how electric vehicles can be used by customers in commercial applications such as: delivery routes, equipment and parts distribution, and transportation of people within the Detroit metro area. Market research has shown that many businesses have gasoline-powered light duty trucks and vans which typical-

ly travel 50 miles or less during the workday and have applications as well suited to the G.M. Griffon van.

47755 (CONF-8610122—, pp 301-305) **Role of the electricity supply industry in the market development of advanced battery electric commercial vehicles.** Porter, D.F. (Electricity Council, London, England). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The development of advanced electric commercial vehicles and the support being given by the electricity supply industry for their market development are discussed. Already 300 production vehicles have been purchased by Electricity Boards and a further 200 will be purchased in the coming year. A comprehensive marketing program is aimed at generating vehicle sales to fleet operators and a wide variety of promotional activities are undertaken. The industry is continuing its investment in the development of the sodium-sulfur (Beta) battery with a view to further substantial market expansion.

47756 (CONF-8610122—, pp 306-311) **Limited car traffic in hospital areas and city centers.** Boldrini, W.; Petrecca, G.; Polettini, A. (Progetti srl, Milan, Italy). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The results of studies carried out with the financial support of CNR in the framework of a research project on energy conservation (PFE-II) are presented. Two main items are discussed: (1) utilization of E.V. in hospital areas. A project for Careggi Hospital, Florence, Italy is reported; and (2) car traffic in city centers (Milan in particular) and perspectives of E.V. introduction. Impact on urban environment and human health with reference to Milan center. Studies carried out concern the possibility of EVs to meet the traffic demands by reducing air and noise pollution.

47757 (CONF-8610122—, pp 312-317) **Field test with five battery vans.** Ristborg, H. (Swedish State Power Board, Vattenfall). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Five battery powered vans, Mercedes Benz 307, have been on field test at the Swedish State Power Board (Vattenfall) during the period July 1982-June 1985. The goal with this project was to demonstrate that electric road vehicles in certain applications can be a good alternative to conventional vehicles. Most of the time the vehicles have been isolated from each other. The problems experienced are substantially dependent on the way the vans were operated from the beginning. The first problem was get proper service and maintenance. The main reason for technical problems has been the propulsion battery. The applications were chosen so it would never be necessary to exceed a daily driving distance of 80 km and manage with a maximum velocity of 70 km/hour. After a lot of initial problems it was decided that one of Vattenfall's own departments was going to be responsible for the service on these vehicles. This was a happy change and gave the result that the vans were much better accepted by the users. The specific energy consumption has varied widely and the operating costs have been dominated by the battery.

47758 (CONF-8610122—, pp 318-323) **Sodium-sulfur battery for an electric vehicle application.** Auxer, W. (Chloride Silent Power Ltd., Wayne, PA). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Chloride Silent Power is presently implementing a program to develop and demonstrate the viability of NaS batteries for an EV delivery van application. This program will demonstrate a battery in a vehicle in the early 1987 time frame; out-of-vehicle battery testing will be performed in the latter half of 1986. The battery has a nominal capacity of 70 kWh and is designed to be integrated into a Bedford CF van. The battery employs the unique small NaS cell developed by CSPL designated the PB cell. This nominal 20 Wh cell has an energy density approaching 200 Wh/Kg and has a significant impact on vehicle battery reliability. The status of the CSPL sodium-sulfur electric vehicle battery program is presented, discussing its NaS technology, the EV battery design and it performance.

47759 (CONF-8610122—, pp 324-327) **Sodium/sulfur battery for electric vehicle propulsion.** Birnbreier, H.; Fischer, W.; Benninger, G.N. (Brown, Boveri & Cie. AG, Heidelberg, West Germany). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A prototype sodium/sulfur battery for electric vehicle propulsion is presented. The battery energy density for a 2 hr discharge is 100 Wh/kg and the power density at 2/3 OCV is 165 W/kg. This performance has been projected from the energy and power densities of experimental batteries. The performance data of the prototype battery are used to calculate the drive characteristics of an electric Chrysler T115 Minivan. These characteristics are compared with those of a T115 propelled with both lead acid and experimental sodium/sulfur batteries.

47760 (CONF-8610122—, pp 328-337) **Sodium-sulfur battery development for an advanced electric vehicle powertrain (ETX).** Haskins, H.J.; Reitz, G.A. (Ford Aerospace & Communications Corp, Newport Beach, CA). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A development program for sodium-sulfur electric vehicle (EV) batteries has been successfully completed under US Department of Energy and Ford Motor Company sponsorship. The program objectives were to verify the projected performance benefits of sodium-sulfur in EV applications, and to demonstrate improved cell and battery reliability. The program scope included design of a full-scale 35-kWh battery system; qualification of the cell and module designs; and fabrication and test of a one-third capacity sub-battery. Results from the battery design and sub-battery testing are presented.

47761 (CONF-8610122—, pp 338-343) **Lithium-metal sulfide battery development and submodule demonstration.** Chilenskas, A.A.; Biwer, R.L.; DeLuca, W.H. (Argonne National Lab., IL). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A program has been initiated by the Electric Power Research Institute to examine the feasibility of using the Li-alloy/FeS battery for electric-vehicle propulsion. In the first phase of the program, a joint effort between Argonne National Laboratory and Gould Research Center resulted in the design, fabrication, and testing of two full-scale 12-V modules and related battery components at Argonne's National Battery Test Laboratory. The design of the module and battery components was based upon a van battery design study supported by the US Department of Energy.

47762 (CONF-8610122—, pp 344-349) **Testing of a 30 kWh zinc-bromine electric vehicle battery.** Zagrodnik, J.; Grimes, P. (Johnson Controls, Inc., Milwaukee, WI). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Recent development of the Johnson Controls, Inc./Exxon Research and Engineering zinc-bromine battery has concentrated on the design, assembly and testing of 20 kWh and 30 kWh battery systems. The initial design, which was originally used for 20 kWh (120 V) applications, was modified to build a laboratory model of a 30 kWh (200 V) battery under a DOE sponsored electric vehicle battery program. This laboratory model was initially tested at Exxon Research and Engineering before it was loaned to Ford Motor Company for additional testing as part of a DOE sponsored drive train development program. Upon completion of the Ford testing the battery was sent to Johnson Controls for additional parametric testing, teardown and analysis.

47763 (CONF-8610122—, pp 350-357) **Adaptive battery state-of-change indicator (ASCI) for urban driving.** Burke, A.F. (Idaho National Engineering Lab., Idaho Falls). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Various approaches to developing a battery state-of-charge unit for an electric car to be used in urban driving are discussed. A new approach, called the Adaptive State-of-Charge Indicator (ASCI) method, for determining state-of-charge is presented and tested using available constant-current discharge data for the Chloride EV5T and ALCO 2200 lead-acid batteries. The basis for the new approach is the dependence of the voltage response of the battery over a range of battery current on state-of-charge. The voltage response characteristics of the battery are utilized in a V/sub ij/ matrix which is made up of 100 entries - 10 ranges of current and 10 increments of state-of-charge. The voltages for the 10 current ranges make up the rows of the 10 x 10 v/sub ij/ matrix. The state-of-charge is incremented by 0.1 when $\Delta = \Sigma(V/sub\ j/ - V/sub\ ij/)$ changes from positive to negative. The V/sub ij/ matrix can be developed from laboratory battery test data or using a calibration procedure in which the car is driven in a typical use-pattern. Internal software would determine the V/sub ij/ matrix from the vehicle calibration data. The ASCI approach is adaptive to varying vehicle operating conditions and battery temperature and age, because it infers the battery state-of-charge directly from battery performance. Most other methods for determining SOC in an electric vehicle depend on the measurement of the AH or WH removed from the battery and a method of estimating the actual capacity of the battery either by computation (i.e., Gould SCI) or by an empirical relationship between capacity and average discharge current (i.e., the Puekert curve).

47764 (CONF-8610122—, pp 358-366) **Setting-up of effective procedures for battery management as regards recharging and state of charge evaluation.** Buonarota, A.; Menga, P.; Scarioni, V. (ENEL, Milano, Italy). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Experience in the field with the EV fleet of ENEL (The Italian National Electricity Agency) and, in particular, unsatisfactory battery performance, led to the setting-up of a laboratory research program aimed at pinpointing contributory causes and finding room for improvement. The conclusion of a three-year program was that inappropriate battery management (improper recharging, excessively deep discharges, etc.) may be a main cause of short battery lifetime under real service conditions. Subsequent laboratory work was, therefore, directed towards acquiring more knowledge of battery behavior in order to improve management. As regards recharge behavior, a large set of experimental results, based on measurement of the gas that developed during recharging, showed the quantitative relationship between charge acceptance and recharging conditions. This enabled effective recharging criteria to be drawn up, and a validation program was recently begun with a view to assessing the benefits of a charging procedure based on the knowledge acquired by conventional methods. As regards the evaluation of battery state-of-charge, an assessment has been made of the measurable parameters that appear to be more sensitive to the state-of-charge. The results so far obtained are given, and the prospects of setting up reliable procedures discussed.

47765 (CONF-8610122—, pp 367-378) **Fast torque response ac electric drive.** Gritter, D.; Slicker, J.; Turner, D. (Eaton Corporation, Southfield, MI). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A fast torque response ac electric traction drive which is being developed for a light van propulsion system is described. The drive utilizes a field oriented control approach for achieving fast torque response. An outer control loop, which features a state estimator for estimating transaxle output shaft torque, is used for overcoming vehicle driveline resonances which exist at slow speeds and during startup. The development of a 30 kW transistor inverter is described. The inverter features an active base drive current limit and collector-to-emitter voltage clamp for reducing base drive power. Packaging and thermal design considerations for this high power density inverter are discussed. Design considerations for producing the high power density, low inertia motor, having the capability for cost-effective volume production, are discussed.

47766 (CONF-8610122—, pp 379-386) **Optimization of an integrated ac propulsion system.** Kelledes, W. (Eaton Corp., Southfield, MI). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The methods, rationale, and results of an analytical study to optimize a complete ac electric vehicle propulsion system are discussed. Given a set of performance parameters and operational criteria for a suitable vehicle, the necessary trade-offs, iterations, and analyses are described to properly size, select and match critical subsystem components. Based on the Department of Energy DSEP system, the details of such a study necessary to properly match the traction battery and the drivetrain components for a small van are described. Emphasis is placed on key issues such as battery power vs. energy capacity, system voltage levels, motor power and torque, number of transmission speeds and ratio step sizes, and power electronics considerations.

47767 (CONF-8610122—, pp 387-395) **Advanced electric vehicle powertrain (ETX-I) performance; component testing.** King, R.D.; Koneda, P.T. (General Electric Co., Schenectady, NY). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A unique electric vehicle powertrain system which totally integrates a 50 hp 3-phase ac induction motor, a fully automatic 2-speed transaxle, power inverter and controls has been developed and tested. This powertrain system, designated ETX-I, was a joint development of Fort Motor Company and General Electric Company and was funded as a major element of DOE's Electric and Hybrid Vehicle Program, contract no. DE-AC08-82NV-10308. The powertrain was designed to provide a low cost, light-weight, highly efficient and practical system based upon the most advanced automotive practices, and represents the state-of-art in electric vehicle powertrain technology. The results of powertrain testing, which characterized the subsystems, evaluated performance, and determined component efficiencies are presented. Test results were obtained using an integrated motor and transaxle installed on a dynamometer with computer controlled data acquisition. The effects of parametric variations in battery voltage and transaxle oil temperature were evaluated and test results compared against program objectives.

47768 (CONF-8610122—, pp 396-400) **ETX-II - a second generation advanced ac propulsion system.** Bates, B.; Patil, P.B.; Ciccarelli, M.F. (Ford Motor Co., Dearborn, MI). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Improvements in the range and performance, and reductions in the cost, will help accelerate market acceptance of electric vehicles. Advancing the technology of the electric propulsion system is the key to improving these important electric vehicle characteristics. The Ford Motor Company has been awarded a research and development program, supported by the Department of Energy's Electric and Hybrid Vehicle program, to develop a second generation advanced electric vehicle propulsion system suitable for use in a small commercial van. The characteristics of the concept that is being developed are discussed and includes a discussion of the system constraints, including traction battery constraints, and brief descriptions of the major subsystems being developed. The components discussed include; the system controller, dc to ac inverter, an internal permanent magnet ac motor and a two-speed automatic transmission with an integral final drive and differential. The motor and transmission are on a common axis and are integrated into one compact unit that is integral with the rear axle of the vehicle.

47769 (CONF-8610122—, pp 401-405) **Development of an ac induction motor control system for electric vehicles.** Jindo, T. (Ministry of International Trade and Industry, Tokyo, Japan). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Nissan's development of an ac induction motor system for an EV (Electric Vehicle) is described. Research on an ac induction motor system has been conducted from 1982 in an attempt to exploit the ac motor's potential merits, such as its high efficiency, freedom from maintenance, compactness, light weight and lack of brushes, to enhance EV performance. Generally, the speed and torque controller for ac motors requires a complicated feedback system such as using a vector control method. This controller was developed at the first stage of development. However, it was not only too complex, but also the volume of the current feedback loop was difficult to adjust. Therefore, a set value of applied voltage and slip frequency were analyzed in relation to motor output and, as a result, a simple controller which omits the current control circuit was developed. By incorporating optimum values of applied voltage and slip frequency which produce high output power and low motor current in every operating conditions into its software. A new control method was developed for ac induction motors which provides both high efficiency and quick response.

47770 (CONF-8610122—, pp 406-421) **High performance, low cost ac traction drive.** Rippel, W. (Jet Propulsion Lab., Pasadena, CA). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

AC drive, using the combination of an induction machine and a transistorized PWM inverter is recognized for its advantages relating to specific power, cost and efficiency. A system under development is discussed which combines a number of power-related and control-related developments to achieve further improvements for each of the above criteria. The power-related developments include improved Darlington transistors, a new base-drive scheme, improved heat transfer techniques, laminated power busing, integrated housekeeping circuitry and optimized motor design. The control-related developments include an open-loop, current-mode scheme which provides optimal control of slip and carrier frequencies for operation over wide ranges of speed and torque.

47771 (CONF-8610122—, pp 422-427) **Ac powertrains for electric vehicles.** Hamilton, W. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Comparison of several US powertrain developments from the recent technical literature shows that powertrain cost and weight have fallen by over 60% since 1979 and that ac systems now rival dc systems. The JPL ac system, lightest and least expensive of those compared, could bring important additional savings to the weight and cost of the vehicle it would propel. But the JPL system is not yet complete, though its ac inverter and induction motor have been successfully tested. It requires matching to a transaxle and the integration of a battery charger, state of charge meter, and dashboard instrumentation, plus provisions for battery management an overall vehicle control. Safety demands special attention because the JPL system is to use a battery charger without an isolation transformer and includes no contactors or quick-disconnect switches.

47772 (CONF-8610122—, pp 443-447) **Battery powered skid-steer loader: its design and performance.** Alcock, R. (South Dakota State Univ., Brookings). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The design considerations for a battery powered skid-steer loader are described. This vehicle is seen as having typical skid-steer loader applications, which include agriculture and the building industry. It has been designed to make use of the weight associated with the battery mass, and incorporates the unique design feature (for skid-steers of this type) of side entry.

47773 (CONF-8610122—, pp 461-466) **Suitability of lead/acid batteries for powering a town car.** Milner, P.J. (Sinclair Vehicles, Coventry, England). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Accepting that the operational requirements of the long range family car cannot be satisfied by the lead/acid batteries, a more appropriate personal transport application, the town car is discussed. The town car concept is taken to imply acceptability of low cruise speed, limited daily range and lower standards of seating, riding and environmental comfort. A product profile is presented of a vehicle designed accordingly. The design is characterized by lightweight construction and low resistance to motion which keep the powertrain duty levels low and minimize battery pack requirements. Starting from a base package and a set of minimum performance targets, a number of key vehicle parameters are defined. Using these values, actual performance characteristics are calculated and behavior of the vehicle in conditions other than those specified is illustrated.

47774 (CONF-8610122—, pp 467-471) **Characteristic warmup distance of an EV in city driving and its dependence on air temperature.** Prans, G.; Chaya, H.J. Jr. (Manhattan College, Riverdale, NY). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A 1980 Ford Fairmont station wagon EV was tested on a 1.104-mile city street track in NYC. Data acquisition during each lap was used to calculate the battery electrical energy expended per lap, EB/LAP, of the track. It was found that EB/LAP varied with distance driven, x (in laps), as EB/LAP (x) = A + B[exp(-x/L)] (Wh/lap). For each day's data, values of A, B, and L could be found such that the function fit all data to within 3%. EB/LAP (x) varied with controller type, tire type, and air temperature. The overall decrease in EB/LAP (x) from the first lap to the 20th lap was as much as 15% on any one day.

47775 (CONF-8610122—, pp 472-476) **Comparative EV performance with low-hysteresis and steel-belted radial tires.** Chaya, H.J. Jr.; Prans, G. (Manhattan College, Riverdale, NY). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A study was made to compare the low-hysteresis Pirelli P8 radial tire to a Goodyear steel-belted radial tire. Several methods of estimating the energy consumption of an EV were used as criteria. For a 20-mile trip energy consumption was about the same for both tires. Data suggest that the energy consumption per mile decreases with distance traveled due to warming of the EV and tires. At low temperatures the Pirelli tire warms up faster, but for trips longer than 20 miles the Goodyear tires may have the net advantage.

47776 (CONF-8610122—, pp 477-482) **Technico-economic evaluation of future advanced EV batteries: a European study.** Jensen, J.; Julian, P.M.; Schutz, P.M. (Energy Research Lab., Odense M, Denmark). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Within the European co-operation in the field of scientific and technical research (COST), a rather comprehensive study of future EV technology has been carried out under research action COST 302: Electric Vehicles. Some results from the working group: On-board Energy Conversion and Storage Systems are discussed. An assessment of technical performance, resource costs, and estimated time of commercialization has been made for systems currently under development in Europe. Energy sources, i.e., batteries, fuel cells and, ICE-electric generators as well as peak power sources, i.e., batteries and electromagnetic flywheel units are included in the COST 302 study. Apart from already commercial batteries, Pb-acid and Ni-Cd, the assessment reported covers near term (Ni-Fe, Zn-Br), medium term (Ni-Zn, Na-S), and long term (Li-solid state) options.

47777 (CONF-8610122—, pp 483-484) **Half-ton electric van with an all HD polyethylene body.** Tikkanen, H. (Neste Oy, Espoo, Finland). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A prototype of an all polyethylene bodied electric delivery van has been constructed as the result of the Finnish EV project. The vehicle was designed from scratch to satisfy the needs of the user in various kinds of delivery operations. The use of polyethylene as body material enabled very light and easy-to-manufacture body construction. A pre-series of 10 vehicles with DC series motors and lead-acid batteries will be built during 1986 and tested in everyday use by newspaper publishers and the Finnish Post Office. Also new technical solutions such as combined chopper/charger and new types of batteries will be tested in the near future. The series production of the vehicle itself is planned to start during 1987-88.

47778 (CONF-8610122—, pp 485-495) **Electric vehicle with high performance inverter, controller and battery prediction.** Chan, C.C.; Leung, W.S.; Lo, W.C. (Univ. of Hong Kong). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

An advanced ac drive system used in electric vehicles (EV) is described. The system consists of an specially designed 3-phase induction motor, a Pulse Width Modulated (PWM) transistorized inverter with novel improvements, and an advanced IC electronic controller. The special features of the drive system are discussed, with emphasis on the control strategy which can optimize the performance of the electric vehicle and the energy consumed. An onboard Battery Prediction Device (BPD) wad developed in the project for real-time monitoring and predicting the battery's charge. The experimental results obtained from laboratory test and road test show that the drive control system is highly satisfactory.

47779 (CONF-8610122—, pp 496-502) **Advanced electric vehicle powertrain (ETX-I) performance: vehicle testing.** Fenton, J.E.; Patil, P.B. (Ford Motor Co., Dearborn, MI). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The ETX-I powertrain represents the most advanced electric vehicle technology in operation today. This powertrain was developed by Ford Motor Company and General Electric Company as a major element of the US Department of Energy's Electric and Hybrid Vehicle program. During the final phase of this program, a vehicle test plant was developed, test requirements defined, and procedures carefully followed to measure the acceleration, gradability, and energy consumption performance of the powertrain and to characterize component efficiencies. An electric chassis dynamometer was used for the majority of the tests to minimize test variability.

47780 (CONF-8610122—, pp 503-507) **Mini-el: a new Danish commuter vehicle concept.** Jensen, S.V.; Nissen, O.S. (El-Trans, Randers, Denmark). 1986. NTIS, PC A03/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

A new Danish low cost electric vehicle concept is now being prepared for production. During a two-year phase of development the work has been concentrated on an electric vehicle with the following specifications: (1) a 3 wheeled one-seat light-weight construction with a monoque chassis/body construction built in a combination of different plastic materials; (2) the upper half of the vehicle forming a sort of a canopy will be a vacuum formed transparent section fitted with glass giving the driver a 360 field of view; (3) one additional seat with enough space for 1-2 children or for payload; and (4) very low expenses for purchasing, maintenance and daily use. The result of this development is a beautifully designed electric vehicle for commuters, indeed a completely new concept. The characteristics, technical approaches, development phases and preliminary results of this vehicle development project, which at the beginning of the summer 1987 will result in a mass production are described.

47781 (CONF-8610122—, pp 508-513) **Application of multiple phase dc chopper system to electric vehicle.** Ukita, S.; Takeucki, K. (Toyota Motor Corp., Susono, Japan). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

An advanced dc drive system has been developed for the experimental electric vehicle EV-10. The system consists of a dc shunt motor, three-phase transistor choppers and a microprocessor-based controller. The three-phase chopper system is employed for improvement of system efficiency and reduction of acoustic noise, and through the tests, availability of the system is confirmed. Further, by adopting the microprocessor-based controller, the overall performance of the vehicle has been improved.

47782 (CONF-8610122—, pp 514-520) **Nickel-iron battery thermal behavior during operational utilization on electric vehicle.** Tonnerieux, F.; Madery, C.; Liska, J.L. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Initial testing of a SAFT Nickel-Iron battery on a Renault Master (3.5 T) proving vehicle has resulted in accumulator overheating, reducing vehicle availability. A mathematical model has been created, representing the thermal phenomena observed on the battery. This has defined the cooling conditions required for normal vehicle utilization and availability. Battery geometry and cooling system characteristics were thus defined after confirmation in wind-tunnel testing. Tests currently being carried out in testing. Tests currently being carried out in chatellerault (France), on an experimental fleet of 10 vehicles, confirm the theoretical results.

47783 (CONF-8610122—, pp 521-526) **Effect of track grades on electric vehicle range and energy requirement.** Burke, A.F. (Idaho National Engineering Lab., Idaho Falls). 1986. NTIS, PC A23/MF A01. File Number DE87010697. Contract AC07-76ID01570.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The effect of grade on the range and energy requirement of an electric vehicle tested on a track having significant grades was studied. The analytical approach taken includes the effect of grade on the road load and battery power required and then determines the effect on battery depletion using the fractional utilization model to describe the battery. The analytical expressions obtained are applied to the Bedford Van for grades up to +/-2%. It is found that the effect of grade on the energy requirement (kWh/mi) is relatively small, but the effect on vehicle range can be significant. For example, at 50 mph and an undulating grade of 2%, the effect of grade on the energy requirement is less than 5% while the range is reduced by about 25%. The predicted effect of grade on vehicle range is compared with the measured effect using Bedford Van data taken on a dynamometer and a nonflat track. For a constant speed of 47 mph, the range on a track having a maximum grade of about 2% is found to be about 20% less than that on the dynamometer. This range reduction agreed well with that predicted using the analytical method developed in this study.

47784 (CONF-8610122—, pp 527-528) **On-road performance of an ac-drive passenger EV.** Tikkanen, H. (Neste Oy, Espoo, Finland). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

An ac-drive passenger EV has been developed by a group of Finnish companies. The design and technology of this car is described and the results of the on-road performance measurements are presented and discussed.

47785 **(NP—7770321) Vibration characteristics of an electrically driven Laval shaft.** Heitmann, F.T. (Technische Univ. Berlin (Germany, F.R.). Fachbereich Physikalische Ingenieurwissenschaft). 19 Feb 1986. 160p. (In German). NTIS (US Sales Only), PC A08. File Number DE87770321.

The author calculates the vibration characteristics of an electric motor plus Laval shaft system. The Laval shaft replaces a supercritic rotor; it is driven both by on asynchronous motor and by a d.c. shunt motor. The performance characteristics of the two different resulting systems are calculated, the combined effect of bending and torsional vibrations is investigated, and parameter studies are carried out for both systems. (HAG).

47786 **(SV-UE-FUD—86-6) Electric vehicles in commercial applications - demonstration project.** Lange, L.; Ristborg, H. (Swedish State Power Board, Aelvkarleby). 26 Jun 1986. 33p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753123.

Five battery-powered Mercedes Benz 307 vehicles, serving as normal commercial vehicles at various locations within Swedish State Power Board were tested over a period of three years, starting on the 1st of July 1982. This demonstration project was preceded by a short-term test on one vehicle, which produced very negative results, and major design modifications were therefore carried out on the vehicle before the demonstration project was started. Negative results also dominated the introductory stage of the demonstration project. This was mainly due to the fact that the service and maintenance agreement concluded with the supplier was not up to expectations. After some time, service and maintenance were transferred to our Heavy Transport Dept., which proved favourable results. After this re-assignment of duties, it became possible to assess the performance of the vehicles in relation to the requirements needed for our applications. The tests proved that the limitations of the vehicles in terms of range per charge, speed and load-carrying capacity did not significantly affect their usability in the selected applications. The specific energy consumption was found to be highly dependent on a number of different conditions that had no equivalent in petrol-engined vehicles. In the first place, the driving technique of the driver and the daily distance travelled by the vehicle had a major influence. In addition, the performance of batteries supplied by different manufacturers varied within wide limits. The overall mean energy consumption from the mains was 1.44 kWh/km, and the mean distance travelled per working day was 31 km. (authors).

47787 **(SV-UE-FUD—86-13) Test of the electric car Whisper, equipped with Ni/Fe batteries.** Johansson, M. (Swedish State Power Board, Aelvkarleby). 13 Jun 1986. 30p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753122.

The car was equipped with a Ni-Cd battery and the tests were performed under different conditions. The energy consumption was about 0.45 kWh/km (i.e. the energy from the electric grid/km). The battery capacity was much depending on the charge/discharge-characteristics. The energy consumption was varying a lot with the traffic situation and the driving style, the batterycurrent consumption varied between 1.65-2.5 Ah/km. The Ni-Cd battery had a low efficiency of about 56 per cent. (L.E.).

3304 Hybrid Systems

REFER ALSO TO CITATION(S) 47718, 47749

47788 (CONF-8610122—, pp 109-117) **Hybrid vehicles and consumer preferences.** Hamilton, W. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Consumer preferences for hybrid vehicle configurations defined by the JPL Hybrid Vehicle Assessment (HVA) were investigated using an ordered logit market model and a parametric vehicle model, assuming high-performance nickel-zinc batteries. The results indicate that: HV market potential is at least twice that of electric vehicles using the same technology, because consumers value long range and quick refueling very highly; high HV acceleration capacity costs more than it is worth to the average consumer; and HV electric range should be kept short to minimize vehicle first cost.

47789 (CONF-8610122—, pp 172-178) **Batteries for hybrid vehicles or other high-power applications.** Miller, J.F.; Lee, J.; Christianson, C.C. (Argonne National Lab., IL). 1986. NTIS, PC A23/MF A01. File Number DE87010697. Contract W-31-109-ENG-38.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Argonne National Laboratory conducted a study to identify promising battery designs for application in future hybrid vehicles (HVs). A preliminary set of battery requirements for HVs was established using information available from previous studies and also by contacting potential HV developers worldwide. The consensus of the information obtained indicated that, is compared with the electric vehicle batter, the HV battery will be smaller and lighter, must have higher power capability per unit weight and will, on the average, be discharged at higher rates. Based upon the preliminary battery requirements, many different battery technologies proposed for the hybrid-vehicle mission were evaluated. Although no existing battery presently developed satisfies all of the preliminary requirements, the analysis has shown that several battery types, with appropriate redesign and development, are good candidates for meeting the hybrid-vehicle application requirements.

47790 (CONF-8610122—, pp 219-227) **Hybrid vehicle revisited.** Renner, R.A.; O'Connell, L.G. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The feasibility of hybrid electric propulsion systems for passenger cars and local delivery vehicles has been assessed, in a study sponsored by the Electric Power Research Institute (EPRI). Hybrid vehicles of interest to EPRI are those which can use a significant amount of externally-generated electricity for propulsion. Advantages of hybrid vehicles are clearly outlined. Range extension over that of an electric vehicle is an important plus. A high degree of fuel flexibility is achievable. The cost of general-purpose passenger cars with hybrid power systems would be too high to be competitive with conventional autos, but specialty vehicle markets such as delivery vans could potentially benefit from hybrid electric power systems.

47791 (CONF-8610122—, pp 228-234) **Automatic control of a hybrid vehicle.** Assbeck, F.; Bidan, P.; Marpinard, J.C.; Salut, G. (Laboratoire d'Automatique et d'Analyse des Systemes du C.N.R.S., Toulouse, France). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The automatic control of a hybrid vehicle of thermic electric type is discussed. Its main purpose is to allow kinetic energy retrieval and phoning when slowing down, while this energy is being used as an electric complement when speeding up. A non-linear control strategy manages the system, so that the thermic engine provides the steady state energy, where as the electric engine deals with the transient complementary energy which is (1) needed for propulsion, and available from kinetic energy retrieval.

47792 (CONF-8610122—, pp 235-240) **Electric hybrid car.** McInnis, S.A. 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The electric hybrid car described resulted from a study of the battery-powered electric car and its problems. Batteries have received a lot of development, but still have limited storage capacity, heavy weight and a high cost. The electric car has been limited by electric motor's speed range and drop off in power at the end of field weakening. The electric hybrid car, as presented, has these characteristics and advantages: (1) batteries are limited, needed only for control and a place to store energy from regenerative breaking; (2) an electric motor with the McInnis Control Coils significantly increases the speed range; and (3) heat-engine and generator with voltage control from zero to maximum without an electronic chop-

per. When batteries are perfected, the electric car will still be travelling in the slow lane if voltage is limited to the battery pack and a wide speed range motor is not available. This not so when the McInnis Control Coils are used.

47793 (CONF-8610122—, pp 241-247) **Petrol-electric hybrid drive in the VW Golf.** Saridakis, N.; Josefowitz, W. (Volkswagen AG, Wolfsburg, West Germany). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Cars for the future will have to make even more sparing use of energy, and operate with even lower noise and exhaust emission levels. The combination of an IC-engine with a small electric motor represents a relatively simple, low cost solution, compared with a pure electrical powered vehicle, that meets these requirements. By suitable apportioning the amount of work done by the IC-engine and the electric motor, more efficient use can be made of available energy, while the hybrid drive system also has lower operation costs. The Hybrid-Golf can save up to 66% liquid fuel on the European cycle and about 40% liquid fuel in the city traffic of Brunswick. The exhaust and noise emissions are better than those for the conventionally powered car.

47794 (CONF-8610122—, pp 428-442) **Future hybrid electromechanical very advanced propulsion systems for civilian wheeled and tracked all-terrain vehicles with extremely high mobility.** Fijalkowski, B.T. (Cracow Polytechnical Univ. Thaddeus Kosciuszko Memorial, Poland). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

The design and construction on experimental proof-of-concept hybrid electromechanical VAP (Very Advanced Propulsion) systems for civilian wheeled and tracked ATVs (All-Terrain Vehicles) with extremely high mobility are discussed. These systems were to be developed using VAP technology improvements to reach a level of performance considerably better than state-of-the-art hybrid electromechanical or fluidomechanical AP (Advanced Propulsion) systems. The use of these hybrid electromechanical VAP systems for civilian wheeled electrochemical VAP systems for civilian wheeled tracked ATVs with extremely high mobility opens up wide possibilities for improving fuel economy.

47795 (CONF-8610122—, pp 448-460) **Hybrid vehicle applications for stochastic road load environments.** Bullock, K.J. (Univ. of Queensland, St. Lucia, Australia). 1986. NTIS, PC A23/MF A01. File Number DE87010697.

From 8. international electric vehicle symposium; Washington, DC, USA (20 Oct 1986).

Hybrid power plants may optimize vehicles for specific traffic situations. Automobiles and light commercial vehicles powered by spark ignition engines operate in suburban traffic where stop/start driving wastes fuel. Thus energy storage and/or a C.V.T. would enable the engine to be operated at near peak efficiency. In highway driving, load leveling of hills by energy storage in automobiles and buses is relatively unimportant. However, the converse applies to a 40 ton semi-trailer. The design and road tests of 4 hybrid vehicles which save fuel, reduce emissions, improve performance and driveability are described.

3306 Vehicle Design Factors

REFER ALSO TO CITATION(S) 47931

3307 Emission Control

REFER ALSO TO CITATION(S) 48346, 48354, 48355

3308 Alternative Fuels

REFER ALSO TO CITATION(S) 47265, 47716

35 ARMS CONTROL

47796 **(AD-A—182035/6/XAB) Development of a liquid isotonic ration for consumption in an NBC (nuclear, biological, or chemical) environment. Final report, August 1982-September 1983.** Halkiotis, J.; Briggs, J.; Dunne, C.P.; Howker, J.J. (Army Natick Research Development and Engineering Center, MA (USA)). 20 Jan 1987. 42p. (NATICK/TR—87/020). NTIS, PC A03/MF A01.

To ensure U. S. Forces fight and win the first battle on an integrated battlefield, soldiers must have the capability to conduct successful operations in a nuclear, biological, or chemical (NBC) contaminated environment for extended periods of time (24 hours or longer). This capability would be seriously affected by a lack of subsistence. To achieve this goal, a liquid ration was formulated to be consumed through the tube of the protective mask. Parameters for the electrolyte composition for this isotonic liquid ration were developed by The Office of The Surgeon General, and formulated by the Food Engineering Directorate of the U.S. Army Natick Research, Development, and Engineering Center.

47797 **(AD-A—182079/4/XAB) Artificial Intelligence/Enemy Courses of Action (AI/ENCOA) user's manual. Final report, January 1984-February 1985.** Luster, P.; McIntyre, J.R.; Adelman, L.; Lehner, P.E.; Donnell, M. (PAR Technology Corp., McLean, VA (USA)). Apr 1987. 146p. NTIS, PC A07/MF A01.

AI/ENCOA (Artificial Intelligence/Enemy Courses of Action) is a prototype decision aid designed to assist Army tactical intelligence analysts in evaluating alternative enemy courses of action. AI/ENCOA combines the use of additive multi-attribute utility (MAU) models for courses of action (Scores and weights) to the MAU model. AI/ENCOA is composed of two parts: a generic software package that implements a combined AI/MAU architecture and two COA rule bases for evaluating different types of possible enemy courses of action. This report is a user's guide that contains an overview of the aid, a detailed demonstration of its operation, an explanation of the menu options, and reference material consisting of the background scenario for the demonstration and rationale for score assignment in the underlying model.

47798 **(AD-A—182099/2/XAB) Chemical warfare - biological defense research obligations. Annual report, 1 October 1985-30 September 1986.** (Office of the Under Secretary of Defense for Research and Engineering, Washington, DC (USA)). 30 Sep 1986. 80p. NTIS, PC A05/MF A01.

Partial Contents include: Chemical Research; Lethal Chemical Program; Incapacitating Chemical Program; Defensive Equipment Program; Physical Protection Investigations; Warning and Detection Investigations; Medical Defense Against Chemical Agents; Chemical Decontaminating Material; Collective Protection Concepts; Chemical Detection and Warning Material; Medical Chemical Defense Life Support Material; Training Support; Simulant Test Support; Management and Support; Biological Defense Research; Medical Defense Against Biological Warfare.

47799 **(AD-A—182526/4/XAB) Interim medical decontamination handbook preparation. Phase 1: test plan development. Interim report (Final), August 1983-April 1985.** Ehntholt, D.J. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Nov 1986. 49p. (ADL—89143-01). NTIS, PC A03/MF A01.

In order to identify materials readily available on USAF bases, which might be used in an emergency to decontaminate casualties who had been exposed to chemical warfare agents, a series of tasks were conducted. These included the development of a skin contamination/decontamination model from relevant literature, the identification of evaluation criteria, and the formulation of a proposed laboratory test program.

47800 **(AD-A—182758/3/XAB) Combating terrorism - a response in kind. Student essay.** Lum, T. (Army War Coll., Carlisle Barracks, PA (USA)). 13 May 1987. 23p. NTIS, PC A02/MF A01.

Outside of armed conflicts representing nations with forces in uniforms, another kind of war has emerged waged by terrorists. For the past twenty years terrorists have waged war against nations for a variety of reasons. No rules of war govern their conduct nor do they observe any. Methods of combatting terrorism vary from nation to nation. Few nations agree totally on how to combat this form of lawlessness. This essay examines one approach and suggests another. President Reagan's ultimate decision to bomb Libya is examined through a discussion of the events, repercussions of these events, and world opinion of these events that preceded his decision. A harsher, more-controlled and personal approach to combatting terrorism is suggested and discussed.

3502 Proliferation

47801 **(AD-A—182729/4/XAB) Chemical warfare in the Third World. Summary report (Final).** Kroesen, F.J.; Ginn, W.H.; Gerrity, J.; Stoner, J.K.; Thompson, E.R. (Institute for Defense Analyses, Alexandria, VA (USA)). Apr 1987. 50p. (IDA-P—2017). NTIS, PC A03/MF A01.

This report is a condensed and unclassified summary of a study that assesses the threat posed by the proliferation of chemical munitions and delivery systems among Third World nations. The objective was to describe the chemical environment and potential CW threat from Third World areas, assess the capabilities of U.S. military forces to cope with such threats, and explore the possibility that terrorists may employ chemical munitions in support of their activities.

3503 Verification

REFER ALSO TO CITATION(S) 47245, 47246

47802 **(UCRL—95313) On-site inspection for verification of a Comprehensive Test Ban Treaty.** Heckrotte, W. (Lawrence Livermore National Lab., CA (USA)). Oct 1986. Contract W-7405-ENG-48. 25p. (CONF-8610136—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87009737.

From SIPRI/CIIPS study on a comprehensive test ban; Ottawa, Canada (23 Oct 1986).

A seismic monitoring system and on-site inspections are the major components of a verification system for a Comprehensive Test Ban Treaty (CTBT) to give parties assurance that clandestine underground nuclear weapon tests are not taking place. The primary task lies with the seismic monitoring system which must be capable of identifying most earthquakes in the magnitude range of concern as earthquakes, leaving a small number of unidentified events. If any unidentified event on the territory of one party appeared suspicious to another party, and thus potentially an explosion, an on-site inspection could be invoked to decide whether or not a nuclear explosion had taken place. Over the years, on-site inspections have been one of the most contentious issues in test ban negotiations and discussions. In the uncompleted test ban negotiations of 1977-80 between the US, UK, and USSR, voluntary OSIs were established as a basis for negotiation. Voluntary OSIs would require between the parties a common interest and cooperation toward resolving suspicions if OSIs were to serve the purpose of confidence building. On the technical level, an OSI could not assure identification of a clandestine test, but an evader would probably reject any request for an OSI at the site of an evasive test, rather than run the risk of an OSI. The verification system does not provide direct physical evidence of a violation. This could pose a difficult and controversial decision on compliance. 16 refs.

36 MATERIALS

REFER ALSO TO CITATION(S) 48996, 49055

47803 **(DOE/ER—0340) Energy Materials Coordinating Committee (EMaCC): Fiscal year 1986, Annual technical report.** (USDOE Office of Energy Research, Washington, DC. Office of Basic Energy Sciences). May 1987. 477p. NTIS, PC A21/MF A01; 1; GPO Dep. File Number DE87014959.

The first part of the Program Descriptions consists of a funding summary for each Assistant Secretary office and the Office of Energy Research. This is followed by a summary of project titles and objectives, including the program/project manager(s) and principal investigator. The second part of the Program Descriptions consists of more detailed project summaries with project goals and accomplishments. They are for the Offices of Conservation and Renewable Energy, Energy Research, Nuclear Energy, Civilian Radioactive Waste Management, and Fossil Energy. Each of these are numbered for purposes of reference in the Keyword Index. The FY 1986 Budget Summary for materials activities in each of the 29 programs within the DOE are also included.

47804 **(DOE/ER/12040—T1) Energy changes in transforming solids: Final report, April 1, 1982 to November 30, 1986.** Herrmann, G.; Barnett, D.M. (Stanford Univ., CA (USA)). 1987. Contract AS03-82ER12040. 16p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87011257.

This research covers conservation (balance) laws in defect mechanics, energy release rates in elastic body, conservation laws in dislocation continuum, gauge field theory of a continuum with dislocations and disclinations, hoop stresses around circular holes in elastic sheets, fracture of nonhomogeneous materials, thermodynamics of continuous damage in solids, layered composites, and misfitting or transformed inclusions and dislocations in impure solids. (DLC)

47805 **(INIS-SU—417) Quantum radiophysics. Collection.** (AN SSSR, Moscow. Fizicheskij Inst.). 1986. 65p. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).
Individual papers have been cataloged separately. (WRF)

3601 Metals And Alloys

REFER ALSO TO CITATION(S) 47041, 47140, 47180, 47205, 47342, 47342, 47416, 47416, 47433, 47434, 47434, 47436, 47438, 47964, 47989, 48141, 48143, 48160, 48160, 48292, 49131, 49131

47806 **(AD-A—182524/9/XAB) Processing and superplasticity in lithium-containing Al-Mg alloys. Master's thesis.** Sanchez, B.W. (Naval Postgraduate School, Monterey, CA (USA)). Mar 1987. 53p. NTIS, PC A04/MF A01.

The refined microstructures and superplastic properties resulting from controlled thermomechanical processing of an aluminum-magnesium-lithium-zirconium alloy were evaluated. The processing involved warm rolling at 300 C separately to true strains of 1.9 and 2.6. Increasing the rolling strain enhanced the superplastic ductility of the alloy at 300 C. Elongations in excess of 500 percent without cavitation, and a corresponding strain rate sensitivity coefficient of approximately 0.5, were obtained. TEM investigations of the microstructural characteristics responsible for the mechanical behavior revealed that a more uniformly refined grain structure (2-5 micrometer) evolved by continuous recrystallization in material experiencing the larger rolling strain. It was also concluded that the

increase in rolling strain enhances grain refinement both preceding and concurrent with superplastic deformation. Keywords: Superplasticity, Superplastic deformation, Thermomechanical processing, Thesis.

47807 **(AD-A—182567/8/XAB) Optical measurement of the rms (root-mean-square) roughness of ion-bombarded surfaces. Final report, 1986-1987.** Ferguson, C.D. (Naval Academy, Annapolis, MD). 19 May 1987. 65p. (USNA-TSPR—143). NTIS, PC A04/MF A01.

Ion-implantation and related ion-beam-processing techniques are used to modify the surface of materials and produce certain desirable properties. However, these methods sometimes roughen the surfaces to which they are applied. If undetected, such roughness can lead to erroneous interpretation of data gathered by most standard surface-analysis techniques. Many surface profilometers and scanning electron microscopes lack sufficient spatial resolution to detect fine-scale roughness that can complicate the data interpretation. A simple optical instrument was constructed to measure the root-mean-square (rms) roughness, below about 100 nm, of ion bombarded surfaces. This instrument measures the total integrated scatter (TIS) of almost normally incident laser light, which (under conditions specified by scalar scattering (theory)) is simply related to the rms surface roughness. This paper describes the construction and calibration of the TIS instrument. In addition, it presents results on the rms roughness of several ion-beam-processed systems, including TiN films on Si and Cr and Cr_2O_3 films on AISI 52100 steel, ion beam mixed Mo in Al, Si(x)N(1-x) refractive layers, and GaAs/AlAs superlattices.

47808 **(BNL—40178) Modelling and theories of alloy phase behavior.** Watson, R.E.; Davenport, J.W.; Weinert, M.; Bennett, L.H. (Brookhaven National Lab., Upton, NY (USA); National Bureau of Standards, Washington, DC (USA)). 1987. Contract AC02-76CH00016. 28p. (CONF-8708125—1). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014399.

From Thermochemistry of alloys conference; Kiel, F.R. Germany (1 Aug 1987).

Many trends in alloy phase formation are readily understood in terms of physically plausible atomic parameters. This has led to the introduction of structural maps where two (or more) such atomic parameters are employed as the coordinates and well-defined regions are observed to be associated with particular crystalline phases. These coordinates sometimes involve the difference in atomic parameters and sometimes involve an average. An alternative approach to the emphasis on atomic parameters has been the consideration of how atoms are packed in some crystal structure and how this controls what the constituent atoms may be. Recently this has led to the utilization of Wigner-Seitz (sometimes called Voronoi or Dirichlet) constructs of the atomic cells in a crystal structure and to the observation that sometimes two crystals which are nominally considered to have the same crystal structure according to normal crystallographic designation should be considered to be different. The Wigner-Seitz cell constructs have also offered a framework for understanding trends in the magnetic and chemical properties of particular phases as well as making coordination between crystalline and glassy structures. Neither of the above approaches provides numerical estimates of quantities of thermodynamic interest such as heats of formation. Such heats are being calculated. 42 refs., 15 figs.

47809 **(CEA-CONF—8840) Point defects and atomic diffusion in metallic glasses.** Adda, Y.; Brebec, G.; Gupta, R.P.; Limoge, Y. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Technologie). Sep 1986. 21p. (CONF-860953—17). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752568.

From International conference on vacancies and interstitials in metals and alloys; Berlin, F.R. Germany (14 Sep 1986).

In this paper we review the theoretical and experimental data concerning point defects and diffusion in metallic glasses. We shall show that even though simulations seem to indicate that point defects could exist under certain conditions in glassy alloys there is not yet clear experimental evidence for their existence; in addition their role in atomic transport is not clear since the diffusion mechanisms are not known to date. To conclude, we propose specific experiments and simulations which could be helpful for a better understanding of these phenomena.

47810 **(CONF-870725—11) Structure of rapidly solidified Ni-Ti.** Kenik, E.A.; Godbole, M.J.; Lowndes, D.H.; Pedraza, A.J.; Pedraza, D.F. (Oak Ridge National Lab., TN (USA); Tennessee Univ., Knoxville (USA)). 1987. Contract AC05-84OR21400. 10p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87012252.

From 22. annual meeting of the Microbeam Analysis Society; Kailua-Kona, HI, USA (13 Jul 1987).

Rapid solidification of NiTi under splat-quenching (SQ) and laser-melting (LM) produces several structural modifications. The SQ material exhibits a marked [200] texture with columnar growth. LM produces epitaxial regrowth with a similar grain size. XRD indicates the presence of B2 and martensite in the SQ material. In general, TEM indicates similar results. Martensite formation is suppressed in the near-surface region, presumably as a result of high cooling rates. The R phase observed by AEM may be incommensurate, only present in small amounts, or present only near the midplane of the SQ material. As such, additional XRD and TEM studies are planned to address these points. The near-surface region of the SQ material also exhibits Ti-rich (TiX) precipitates, and Cu_2O cubes. The dominant phase indicated by XRD in the LM material is a $L1_0$ structure with a slight monoclinic distortion. A significant reduction in the amount of martensite in the LM zone relative to the SQ material is indicated by both XRD and TEM. On the basis of TEM, the near-surface region of the LM material exhibits only a B2 (possibly $L1_0$) matrix and a thin surface layer of TiC, which depletes the adjacent B2 of titanium. No amorphization or decrease in order of the B2 phase was observed after rapid solidification. 11 refs., 3 figs.

47811 **(DOE/DP/40200—61) Near-infrared dichroism of a mesogenic transition metal complex and its solubility in nematic hosts.** Marshall, K.L.; Jacobs, S.D. (Rochester Univ., NY (USA). Lab. for Laser Energetics). [1987]. Contract FC08-85DP40200. 25p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014471.

A transition metal complex possessing the nematic phase, bis (p-n-butylstyryl-1, 2-dithiolato) nickel, was synthesized and its optical properties and solubility in the nematic hosts K15 and MBBA were investigated. The metal complex displayed a high solubility in both host materials (up to 10% wt/wt) and a strong near-infrared absorption band centered at 860 nm. A blocking extinction of greater than OD = 3 was obtained with a 100 micron pathlength of a 0.5% wt/wt mixture of the nematic metal complex in K15, suggesting its usefulness for passive blocking of near infrared radiation. A 24 micron thick, homogeneously aligned guest-host cell containing a 1% wt/wt mixture of the metal complex in K15 possessed a contrast ratio of nearly 5:1 and a blocking extinction of OD = 3.5 at 860 nm, demonstrating for the first time the existence of near-infrared dichroism in this class of materials. The solubility and blocking extinction of the mesogenic metal complex in K15 was considerably superior to the non-mesogenic near ir laser dye bis(dimethylaminodithiobenzil) nickel in the same host. An interaction of the nematic metal complex in mixtures with MBBA which resulted in the creation of a new absorption band at 1050 nm was also observed. 21 refs., 9 figs.

47812 **(DOE/ER/13276—T1) Characterization of catalysts with metal-support effects and of the species adsorbed on their surfaces: Progress report, September 1, 1986-August 30, 1987.** Vannice, M.A. (Pennsylvania State Univ., University Park (USA). Dept. of Chemical Engineering). 28 May 1987. Contract FG02-84ER13276. 7p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014636.

Pt crystallite size effects on ΔH/sub ad/ were investigated by varying particle sizes from 1.5 to 1500 nm on SiO_2. This property for CO and H_2 adsorption on Pt is much less affected by crystallite size than on Pd. We have completed our study of heats of adsorption on Pd. It also has provided insight into the H_2-D_2 exchange reaction on Pd. The study of C_6H_6 hydrogenation over Pd catalysts has been completed. We have found that the rate of acetone hydrogenation to isopropanol can be enhanced 100- to 1000-fold over TiO_2-supported Pt. Ongoing studies of crotonaldehyde

hydrogenation have provided evidence that selective hydrogenation of the C=0 bond compared to the C=C bond can be induced by a metal-support effect. Only butyraldehyde is obtained over Pt on typical supports like SiO_2 and Al_2O_3 whereas the use of TiO_2 can produce over 35% crotyl alcohol.

47813 **(DOE/ER/45088—T2) Investigations of creep cavitation in Type 304 stainless steel: Final report, 8 May 1984-11 November 1986.** Delph, T.J. (Lehigh Univ., Bethlehem, PA (USA). Dept. of Mechanical Engineering and Mechanics). [1987]. Contract FG02-84ER45088. 10p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014198.

An experimental technique involving the use of image analyzing computers to count and measure creep cavitation on polished metal surfaces has been developed. This technique has been applied to creep cavitation in the neighborhood of stress concentrations and in uniaxial tension specimens. Measurements made in uniaxial tensions have yielded considerable information about the statistical nature of cavitation, and have allowed detailed quantitative comparisons to be drawn with the predictions of analytical cavity growth models. A parallel modeling effort designed to include probabilistic features into analytical cavity growth models has resulted in a model which reproduces, at least in a qualitative sense, a number of the statistical features observed in experimental cavity growth and creep rupture data. Work along these lines is now being continued under a grant from the National Science Foundation. 9 refs.

47814 **(DOE/ER/45181—4) Microstructural effects on the fatigue behavior of Fe-C-X alloys: Technical progress report, November 16, 1984-November 15, 1987.** Shiflet, G.J. (Virginia Univ., Charlottesville (USA). Dept. of Materials Science). Sep 1987. Contract FG05-85ER45181. 6p. (UVA—527335/MS88/101). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000155.

Purpose of our original project was to obtain a better understanding of the role of various microstructural features on the strength and fatigue behavior of low alloy steels. The program investigated fatigue properties of steels by systematically controlling the microstructure through heat treatments. Three ternary steels were examined: Fe-C-Mn, Fe-C-V, and Fe-C-Mo.

47815 **(DOE/ER/52139—1) The effect of strain rate on the yield behavior of iron-base LRO alloys at elevated temperatures.** Lin, H.T.; Wilcox, R.C.; Chin, B.A. (Auburn Univ., AL (USA)). 1987. Contract FG05-86ER52139. 7p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014893.

The sensitivity of iron-base long-range ordered (LRO) alloys to strain rate at elevated temperatures was investigated. The tensile results indicate that the iron-base LRO alloys exhibit a positive temperature dependence of yield behavior, but are insensitive to variations in strain rate between 10^{-5} and 10^{0} sec^{-1}. These observations, along with SEM and TEM results, suggest that previous proposed diffusion-controlled mechanisms are not responsible for the increase in yield strength with increasing temperature. 12 refs., 5 figs.

47816 (DOE/ER/60420—1, pp 353-366) **Impurities and defects in transition metals and their oxides.** Ellis, D.E.; Guenzburger, D.; Press, M.R. (Northwestern Univ., Evanston, IL). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Self-consistent local density theory is used to calculate the electronic structure associated with impurities and defects in transition metals and their oxides. An embedded molecular cluster scheme is used in which 15-30 atoms are treated explicitly by the LCAO discrete variational scheme, and the surrounding environment is represented by a potential field. One-electron spectroscopic properties are discussed in terms of densities of states and population analyses; emphasis is placed upon detectable features induced by the presence of defects or impurities. Hyperfine fields and local magnetic moments are examined for binary transition metal alloys, and the effects of local clustering are simulated for comparison with Moessbauer, NMR, and neutron magnetic scattering data. The influence of interstitials and vacancies no metal x-ray absorption near edge spectra (XANES) of the monoxides is evaluated and used to interpret features of the M/sub 1-x/O K edge spectra. The energy of formation of isolated cation vacancies in Fe/sub 1-x/O is calculated, and the binding energies of several plausible (m:n) vacancy-interstitial metal defect clusters are presented. The authors give some semiquantitative explanations for the relative stability of different defect configurations.

47817 **(EUR—10576) About properties of point defects in metals.** Schuele, W. (Commission of the European Communities, Ispra (Italy). Joint Research Centre; Commission of the European Communities, Luxembourg). 1986. 32p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752561.

In the following we discuss some selected features of the different radiation damage models in fcc materials and show that the properties of point defects are different from those commonly accepted for more than 30 years. There is evidence that crowdions are stable in some materials, that interstitials migrate almost freely in recovery stage III (ambient temperature in copper) and not in recovery stage I/sub E/ (at 65 K in copper), that consequently their mobility is a factor 10/sup 9/ smaller than commonly assumed, and finally that vacancies migrate in recovery stage IV (above 100 C in copper). The results obtained for Au, Cu and Al are discussed together with results obtained for alloys formed with the respective metals. We discuss some results of experiments which show that the interactions between point defects and especially between point defects and sinks are much larger than previously assumed and that they are so large that the rate equations used for calculations of the changes of defect concentrations during irradiation are not applicable in most cases, and finally that the migration activation energies of defects decrease with increasing high energy particle flux.

47818 **(GKSS—86/E/62) Weld joint properties at hyperbaric MIG/MAG welding.** Mueller, L.; Terlinde, G.; Schwalbe, K.H. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)). 1986. 10p. (CONF-860594—12). GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude, Germany, F.R.

From ASM international trends in welding research meeting; Gatlinburg, TN, USA (18 May 1986).

Reprint from David, S.A. (ed.): Advances in welding science and technology - TWR '86. Proceedings p. 551-558.

Hyperbaric unmanned MIG/MAG welding tests at pressures up to 30 bar (300 m water depth) were performed on pipeline steel StE 445.7 and structural steel StE 36. The study focused on the effects of pressure, shielding gas, electrode and welding parameters on the weld metal chemistry, cooling time, microstructure, strength and especially toughness. In order to achieve good toughness at high pressure the conventional welding conditions have to be changed. These changes include less active shielding gases, modified electrodes and welding with negative polarity at high pressure.

47819 **(HEDL-SA—3474-FP) Effect of loading rate and thermal aging on the fracture toughness of stainless steel alloys.** Mills, W.J. (Hanford Engineering Development Lab., Richland, WA (USA)). May 1986. Contract AC06-76FF02170. 34p. (CONF-870697—2). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014377.

From 20. ASTM's national fracture mechanics conference: prospectives and directions; Leheigh, PA, USA (23 Jun 1987).

The effect of loading rate on the fracture toughness of Types 304 and 316 stainless steel plate and Type 308 weld before and after thermal aging at elevated temperature was characterized using both fracture mechanics and Charpy specimens. Aging at 566°C for 10,000 hours reduced static j/sub c/ values for both wrought and weld metals by 10 to 20%, and tearing moduli were reduced by 20 to 30%. Under semi-dynamic and dynamic loading conditions, the fracture resistance was not decreased below the static response for either unaged or aged materials. The present results also demonstrated that the large degradation in Charpy V-

notch impact energy after aging, as reported in this and other studies, was not representative of the impact resistance for SS components containing cracks or crack-like defects. Fractographic examinations revealed that the large loss in Charpy energy was associated with aging-induced microstructural changes that substantially decreased the energy required to initiate a crack from a blunt notch. At very slow strain rates, creep crack growth was found to cause a significant degradation in fracture toughness. 25 refs., 17 figs., 2 tabs.

47820 **(INIS-mf—10664) Mechanical properties of Cu-Nb and Cu-Nb/sub 3/Sn superconductors.** Kolb-Telieps, A. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 8 Oct 1984. 98p. (In German). NTIS (US Sales Only), PC A05/MF A01. File Number DE87752618.

Cu-Nb wires with extremely thin fibres, which can be drawn into long tapes due to their texture in cold forming, were manufactured by powder metallurgy methods. Both components show a cellular structure. The diameter of the copper cells reaches its final value at about 50 nm and that of niobium cells seems to continue to decrease. Cu-Nb/sub 3/Sn samples were prepared from Cu-Nb wires by outside tinning. The Nb/sub 3/Sn of this compound material does not have a texture, but a grain structure. The mechanical properties of both systems were measured as regards the degree of deformation, fibre diameter, temperature and fibre content.

47821 **(INIS-mf—10669) Investigation of point defects after low temperature irradiation and qenching in diluted W/sup 57/Co alloys.** Wahl, D.M. (Technische Univ. Muenchen, Garching (Germany, F.R.). Fakultaet fuer Physik). 18 Jul 1985. 186p. (In German). NTIS (US Sales Only), PC A09/MF A01. File Number DE87752620.

In high purity tungsten foils and monocrystals with implanted /sup 57/Co probe atoms (diluted W-Co alloys) were point defects investigated using Moessbauer spectroscopy and resistivity measurements. The point defects were produced by irradiation with reactor neutrons, with 3 MeV electrons, or by quenching. It is shown that in irradiated samples moving interstitials and vacancies can be trapped by motionless /sup 57/Co atoms. Annealing of point defects was performed in the temperature range from 4.2 K to 1683 K. (GSCH).

47822 (INIS-SU—413, pp 67-69) **Grouping of radiation-induced dislocation loops in molybdenum.** Zharkov, V.G.; Novikov, I.I.; Zharkova, N.A.; Zharkov, G.F. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780003.

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In Quantum radiophysics. Collection.

Method to determine parameters of radiation damage (dislocation loops) grouping is proposed and experimental check is conducted on molybdenum samples with interstitial impurity content of 10/sup -3/ w.%. Samples were irradiated in a high voltage electron microscope at 300 and 700 K up to emergence of clearly visible dislocation loops. Dislocation loop clusters were characterized by a function, containing data on the number of loops making up a group, the number of groups in an ensemble, the relative position of loops. Functions of loop ensemble grouping in Mo are determined on the basis of the developed technique. 2 refs.

47823 **(KFTI—86-22) Helium thermodesorption from Ni polycrystalline samples irradiated by He^+-ions up to $1x10^{17}$-$1x10^{18}$ ion/cm² doses.** Zelenskij, V.F.; Neklyudov, I.M.; Ruzhitskij, V.V.; Rybalko, V.F.; Bendikov, V.I.; Khazan, S.M. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 26p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703332.

The dependence of thermodesorption (TD) spectra on irradiation dose and TD peak nature in the samples of polycrystalline nickel irradiated at 300 K by He^+ (20 keV) ions up to different doses in the $1x10^{17}$ - $1x10^{18}$ ion/cm² range are investigated. Six peaks in the thermodesorption spectrum at 450, 800, 960, 1170, 1300 and 1530 K have been found. The correlation between TD peaks and arising surface structures is established. The nature of some peaks is bound with blister formation. 43 references, 17 figures.

47824 **(LA-UR—87-2702) Monte Carlo simulation of modulated phases.** Srolovitz, D.J.; Hassold, G.N.; Gayda, J. (Los Alamos National Lab., NM (USA); National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center; Michigan Univ., Ann Arbor (USA). Dept. of Materials Science and Engineering). 1987. Contract W-7405-ENG-36. 11p. (CONF-8708122—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014729.

From Dynamics of ordering processes in condensed matter; Kyoto, Japan (27 Aug 1987).

This paper presents Monte Carlo simulation results for the formation of modulated phases in the framework of the two dimensional ANNNI model with a nonconserved order parameter. This work complements the earlier studies of Kaski, et al. by examining a different, wider area of parameter space and temperature. Like Kaski, et al., it is found that for certain temperatures and values of the frustration parameter, κ, ordered domains form quickly and the correlation length grows as the square root of time. However, there exists a range of κ for which a quench from high to low temperature results in the formation of a metastable glassy phase. In addition to the ANNNI model study, preliminary results are presented on a newly developed model which exhibits phase modulation due to the presence of elastic interactions between the different phase and with an externally applied stress. 12 refs., 12 figs.

47825 **(LA-UR—87-2807) Simulation of the layer-growth dynamics in silver films: Dynamics of adatom clusters and vacancy clusters on Ag(100).** Voter, A.F. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 14p. (CONF-8708110—11). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014764.

From 31. SPIE annual international technical symposium on optical and optoelectronic applied science and engineering; San Diego, CA, USA (16 Aug 1987).

Simulation results are presented for some dynamical processes occurring in the growth of (100) layers of silver. The overlayer dynamics are evolved using a recently developed method that, in the regime where surface diffusion consists of discrete hops, yields classically exact dynamics for an arbitrary interatomic potential. The time-scale limitations of direct molecular dynamics simulations are thus overcome. The Ag/Ag(100) system is modeled using a sophisticated form of interaction potential, similar to the embedded atom method, in which the energy is given by a sum of pairwise interactions plus a term for each atom that depends on the local atomic density. This type of potential includes the many-body terms necessary to describe a variety of atomic environments, such as the perfect fcc metal, free surfaces, vacancies, interstitials, and even the diatomic molecule, but with the computational scaling of a simple pair potential. The present study focuses on some of the dynamics in a single layer of silver: the diffusion and dissociation of clusters of adatoms and vacancies. Some interesting features are observed, including a nonmonotonic decrease in diffusion constant with increasing cluster size, and a roughly constant mean square distance a cluster migrates before dissociation (ejection of a monomer). 41 refs., 9 figs., 2 tabs.

47826 **(LBL—22817) Tensile behavior of superplastic Al-Cu-Li-Zr alloy 2090 at cryogenic temperatures.** Glazer, J.; Morris, J.W. Jr.; Nieh, T.G. (Lawrence Berkeley Lab., CA (USA); Lockheed Missiles and Space Co., Palo Alto, CA (USA). Lockheed Palo Alto Research Lab.). Jan 1987. Contract AC03-76SF00098. 14p. (CONF-870187—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014084.

From International cryogenic materials conference; St. Charles, IL, USA (10 Jan 1987).

The tensile behavior of superplastic Al-Cu-Li-Zr alloy 2090 sheet at cryogenic temperatures is investigated in both superplastically formed and unformed material. In both cases, the tensile properties improve significantly at low temperatures. The improvement in uniform elongation between room temperature and 4°K is especially large. As in other 2090 material with different microstructures, this improvement seems to be associated with increased strain hardening rates at low temperatures. A transition in tensile failure model with decreasing temperature is also observed. 8 refs., 5 figs., 1 tab.

47827 **(LBL—23776) The corrosion of iron rotating hemispheres in 1 M sulfuric acid: An electrochemical impedance study.** Haili, C.C. (Lawrence Berkeley Lab., CA (USA)). Jun 1987. Contract AC03-76SF00098. 360p. NTIS, PC A16/MF A01; 1; GPO Dep. File Number DE87014679.

This research project consists of experimental investigation and theoretical analysis of the corrosion of iron in sulfuric acid. Objectives were: to elucidate the processes governing the complex behavior of the iron-sulfuric acid system, particularly the reaction mechanism, the passivation process, and the observed limiting current and electrochemical oscillations; to improve our fundamental understanding of metal corrosion and passivation phenomena; and to demonstrate the application of the electrochemical impedance method as a tool for the study of electrochemical systems. Experiments carried out were: (1) potentiodynamic experiments to determine the anodic polarization curve, especially the passivation curve; (2) potentiostatic experiments recording the sustained current oscillations that occur within a certain potential range on the limiting current plateau; (3) measurement of the ac impedance of the system at several points along the anodic polarization curve, using a frequency response analyser. Rotating hemispherical iron electrodes were used in most of these experiments. The Kramers-Kronig relations were applied to the electrochemical impedance. The experimental results were compared with theoretical predictions in order to elucidate the behavior of the iron-sulfuric acid system. A concentrated-solution model was used to calculate the impedance, in addition to analytic calculations using infinitely-dilute-solution theory. The calculated results for the reaction mechanism and conditions tested did not agree with the experimental results. 226 refs., 5 figs.

47828 **(LBL—23810) Factors determining the morphology of precipitation in aluminum-germanium and aluminum-silicon alloys.** Westmacott, K.H.; Dahmen, U. (Lawrence Berkeley Lab., CA (USA)). Jul 1987. Contract AC03-76SF00098. 21p. (CONF-870719—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014682.

From 2. international conference on phase transformations in solids; Cambridge, UK (6 Jul 1987).

HVEM in-situ studies of precipitation in Al-Si and Al-Ge alloys complemented by high resolution observations have provided a clear picture of the fundamental nucleation and growth processes. A model for the role of vacancies in precipitate growth was in general agreement with a dynamic sequence recording the loss of coherency during plate growth. High resolution images obtained on the NCEM's Atomic Resolution Microscope provided direct information of precipitate/matrix interface structure, internal precipitate structure and orientation relationships. Based on the observations, simple model nuclei for various morphologies are proposed. These suggest that variations in the absolute and local vacancy supersaturation give rise to the precipitate patterns observed. 19 refs., 9 figs., 1 tab.

47829 (MLM—3419, pp 19-21) **Ion implantation.** Barton, B.D.; Salerno, R.F. Feb 1987. NTIS, PC A03/MF A01. File Number DE87008396.

In Materials science and characterization: Technology update-87.

The process of ion implantation is described and some of its applications for improving materials are pointed out. It is likely to be several years before many of the possibilities are properly addressed. In the interim, improvements in tooling and, consequently, increased productivity in machining operations will be the major benefits from ion implantation.

47830 **(N—87-24007) Environmental degradation of 316 stainless steel in high temperature low cycle fatigue.** Kalluri, S.; Manson, S.S.; Halford, G.R. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Apr 1987. 17p. (NASA-TM—89931; E—3636; NAS—1.15:89931; CONF-870466—5). NTIS, PC A02/MF A01.

From International conference on environmental degradation of engineering materials; University Park, PA, USA (13 Apr 1987).

Procedures based on modification of the conventional Strainrange Partitioning method are proposed to characterize the time-dependent degradation of engineering alloys in high-temperature, low-cycle fatigue. Creep-fatigue experiments were conducted in air using different waveforms of loading on 316 stainless steel at 816 C (1500 F) to determine the effect of exposure time on cyclic life. Reductions in the partitioned cyclic lives were observed with an increase in the time of exposure (or with the corresponding decrease in the steady-state creep rate) for all the waveforms involving creep strain. Excellent correlations of the experimental data were obtained by modifying the Conventional Strainrange Partitioning life relationships involving creep strain using a power-law term of either: (1) time of exposure, or (2) steady-state creep rate of the creep-fatigue test. Environmental degradation due to oxidation, material degradation due to the precipitation of carbides along the grain boundaries and detrimental deformation modes associated with the prolonged periods of creep were observed to be the main mechanisms responsible for life reductions at long exposure times.

47831 **(NIIAR—20(701)) Intermetallic compounds Pt_6An(An=Am,Cm,Bk,Cf).** Radchenko, V.M.; Shushakov, V.D.; Seleznev, A.G.; Ryabinin, M.A.; Lebedeva, L.S.; Vasil'ev, V.Ya. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1986. 18p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703336.

Pt_6An intermetallic compounds (An=Am, Cm, Bk, Cf) have been recovered and investigated. It has been found that they have the hexagonal structure of the Cu_6Ca type. The X-ray amorphization of the $Pt_6{}^{244}Cm$ and $Pt_6{}^{249}Cf$ crystalline structures due to self-irradiation and their recovery after the annealing have been observed. Correlation between the volume of the Pt_6An intermetallide unit cell and the actinide metallic radius has been shown. 15 references, 1 figure, 9 tables.

47832 **(NIIAR—23(704)) Metallic berkelium production.** Radchenko, V.M.; Seleznev, A.G.; Ryabinin, M.A. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1986. 20p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703337.

A 740 mg sample of ^{249}Bk metal has been obtained as a layer on the tantalum substrate by thorium thermal reduction of berkelium oxide. The metal yield amounted 85%. It has been shown that metallic Bk possesses the double hexagonal close-packed structure of α-La type with the parameters, a=(0.3412+-0.0002) nm, c=(1.1060+-0.0006) nm. The thermal expansion coefficients at the temperatures between -180 and +17 deg C has been estimated. 16 references, 1 figure, 7 tables.

47833 (ORNL/M—406, pp 1-7, Paper 1) **Fundamentals of welding.** David, S.A.; Vitek, J.M. (Oak Ridge National Lab., TN). 1987. NTIS, PC A03/MF A01. File Number DE87014358.

In BES [Basic Energy Sciences] welding science: Contractors summary report, 1986-1987.

The principal aim of the Basic Energy Sciences Welding Program at the Oak Ridge National Laboratory is to investigate the physical metallurgy of weldments, during fabrication, in the as-welded condition, and during anticipated service. The program consists of three major parts relating to the study of (1) solidification behavior of weld metal, (2) phase stability of weldment microstructure, and (3) structure-property correlations.

47834 (ORNL/M—406, pp 1-4, Paper 2) **Mass transfer during laser welding.** DebRoy, T. (Pennsylvania State Univ., University Park). 1987. NTIS, PC A03/MF A01. File Number DE87014358.

In BES [Basic Energy Sciences] welding science: Contractors summary report, 1986-1987.

During welding, the vaporization of alloying elements results in a change in the composition of the weld metal affects properties and is a serious problem in the welding of many important engineering alloys. The objective of the program at Penn State is to develop a fundamental understanding of mass transfer during laser welding in order to achieve improved control of composition and properties of the weld. During the past year, the effort was focussed on (1) alloying element vaporization and weld composition

control, (2) understanding the relation between vaporization and the nature of the plasma, and (3) the role of plasma on the interfacial tension of metals (interfacial tension significantly influences weld properties).

47835 (ORNL/M—406, pp vp, Paper 3) **The role of composition and microstructure gradients on weld metal properties and behavior.** Olson, D.L.; Matlock, D.K. (Colorado School of Mines, Golden). 1987. NTIS, PC A03/MF A01. File Number DE87014358.

In BES [Basic Energy Sciences] welding science: Contractors summary report, 1986-1987.

An investigation to evaluate and model the influence of compositional and microstructural gradients resulting from welding on the transformation behavior and properties of weldments is in progress. This investigation involves three specific experimental efforts: (1) The phase stability of duplex Fe-Cr-Al-Mn-Ni stainless steel weld metal, (2) the influence of compositionally modulated structure (weld metal) on high temperature creep behavior, and (3) the influence of compositionally modulated structure (weld metal) on the susceptibility to stress corrosion cracking.

47836 (ORNL/M—406, pp vp, Paper 4) **Welding research.** Chavez, S.A.; Smartt, H.B. (Idaho National Engineering Labs., Idaho Falls). 1987. NTIS, PC A03/MF A01. File Number DE87014358.

In BES [Basic Energy Sciences] welding science: Contractors summary report, 1986-1987.

The objective of the program is to develop a fundamental understanding of microstructure development in the heat affected zone (HAZ) of a weld and the relationship of that microstructure to the mechanical properties. These properties are to be used in a finite element code to predict behavior of a weld under load. Two methods to obtain uniaxial stress-strain curves of the HAZ microstructures were investigated: use of a thermo-mechanical simulator (Gleeble) and use of moire interferometry. From the stress-strain curves, the elastic modulus, yield stress and work hardening slope can be quantified for use in a finite element code. The code ABACUS is being used for elastic/plastic analysis.

47837 (ORNL/M—406, pp 1-4, Paper 5) **The fatigue behavior of weldments in ferritic steels at elevated temperatures: Technical progress report.** McEvily, A.J. (Univ. of Connecticut, Storrs). 1987. NTIS, PC A03/MF A01. File Number DE87014358. Contract FG02-84ER45109.

In BES [Basic Energy Sciences] welding science: Contractors summary report, 1986-1987.

In our study of fatigue crack growth in weldments we have found that at elevated temperature (538°C) in 9 Cr ferritic alloys that process of crack growth through the weld is similar to that through the base metal both in terms of the mechanistic aspects as well as in terms of the rates of propagation. However at room temperature the crack growth process through the weld is associated with more localized crack deflection which we believe is due to the distribution of residual stresses in the weld region. This increased amount of crack deflection gave rise to an increased amount of scatter in the rate of fatigue crack propagation which obscured some of the basic trends we were trying to establish in these experiments. In order to avoid this experimental difficulty we have opted to concentrate our efforts on the behavior of the base material in this report period.

47838 (ORNL/M—406, pp 1-4, Paper 6) **The modelling of transport phenomena in weldpools.** Szekely, J. (Massachusetts Institute of Technology, Cambridge). 1987. NTIS, PC A03/MF A01. File Number DE87014358.

In BES [Basic Energy Sciences] welding science: Contractors summary report, 1986-1987.

The purpose of this investigation is to develop a comprehensive mathematical representation of heat flow and fluid flow phenomena in arc welding operations, with the ultimate objective of relating the welding process parameters to the structure and property of the weldments produced. 7 refs.

47839 **(RFP—3786) Low-pressure eutectic bonding of depleted uranium to copper.** Krankota, J.L.; Edstrom, C.M.; Thomas, R.L. (ed.). (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 22 May 1987. Contract AC04-76DP03533. 73p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014625.

A bonding process using a nickel layer was developed and demonstrated for joining uranium plates to copper plates for heat-sink applications at the Savannah River Laboratory (SRL). The nickel was either electroplated onto the copper or inserted in the joints as a foil. Joints were made with bonding pressures from 15 to 100 psi in a vacuum of 10^{-6} torr at 760°C, slightly above the eutectic temperature of 740°C. Bonding integrity was determined using ultrasonic, metallographic, and mechanical shear tests. The effect of uranium surface cleanliness on bond integrity was also investigated. An alternate joining technique using atmospheric pressure on a bagged and evacuated sandwich of copper and uranium plates was also investigated. These bagged sandwiches were heated using a flat induction coil. Other bonding agents, braze foils GAPASIL-9, CUSILTIN-10, and CUSIL, were also investigated. Good bonds were made using all bonding agents. However, the best bonds were made using nickel as the bonding agent. 3 refs., 55 figs., 6 tabs.

47840 **(SAND—87-1206C) Field ion microscope studies of surface reconstructions.** Kellogg, G.L. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 6p. (CONF-870780—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014644.

From 34. international field emission symposium; Osaka, Japan (13 Jul 1987).

The reconstruction of various metal surfaces has been investigated in atomic detail with the field ion microscope. Unreconstructed (bulk-terminated) surfaces were produced by low-temperature field evaporation and induced to reconstruct either by heating alone or heating in the presence of deuterium. Field ion microscope images recorded before and after the field-free heating interval were used to determine the temperature at which restructuring takes place and the structure of the reconstructed surface. The results clearly showed that the (110) planes of Pt and Ir reconstruct to missing-row structures. The temperature required for restructuring was approximately 300°K for Pt and 500°K for Ir. The reconstructions were observed for (110) planes as large as 40 to 50 A diameter and for clusters as small as five atoms. The direct observation of missing-row structures for these small clusters provides convincing evidence that the reconstructions are driven by short-ranged atomic interactions. Missing-row structures were also produced on higher index planes of Pt such as (311), (211), and (511) by heating to temperatures above 400 K. Small clusters of atoms on the (110) plane of Ni did not reconstruct thermally, but did reconstruct to a missing-row structure when heated to 150 to 170°K in the presence of 10^{-8} Torr deuterium. 12 refs., 3 figs.

47841 **(UCRL—96159) Some speculations on the mechanisms of abrasive grinding and polishing.** Brown, N.J. (Lawrence Livermore National Lab., CA (USA)). 11 May 1987. Contract W-7405-ENG-48. 12p. (CONF-8705183—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014242.

From 4. international precision engineering seminar; Cranfield, UK (11 May 1987).

The mechanisms of grinding, a predominantly fracture mechanism in brittle material, and polishing, a predominantly plastic shearing mechanism, appear quite different. However, in a number of cases it can be shown that the difference between the two mechanisms can be triggered by differences in depth of cut and abrasive size. This paper will present results from recent polishing research that tend to support a physico-chemical interaction model involving aqueous diffusion, internal hydrolysis, and ion exchange mechanisms that may explain the plastic to brittle transition in silicate materials. The model would seem to have clear implications for both low scatter polishing and fine machining of silicate materials.

47842 **(UCRL—96769) Shock-induced melting and rapid solidification.** Nellis, W.J.; Gourdin, W.H.; Maple, M.B. (Lawrence Livermore National Lab., CA (USA); California Univ., San Diego, La Jolla (USA). Inst. of Pure and Applied Physical Sciences). Aug 1987. Contract W-7405-ENG-48;FG03-86ER45230. 5p. (CONF-870753—76). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000226.

From 5. topical conference of the American Physical Society on shockwaves in condensed matter; Monterey, CA, USA (20 Jul 1987).

Model calculations are presented to estimate that ~50 GPa is required to completely shock melt metal powders with quenching at rates up to 10^8 K/s. Experiments are discussed for powders of a Cu-Zr alloy compacted in the usual way at 16 GPa and melted by shocking to 60 GPa. 12 refs.

47843 **(VTT-MRG—B-8608) Optimising the use of energy in the heat treatment of metals using protective gas atmospheres.** Pulkkinen, R.; Virta, J. (Valtion Teknillinen Tutkimuskeskus, Espoo (Finland). Metallilaboratorio). 1986. 119p. (In Finnish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753327.

The theoretical basis of the protective and reactive gas atmospheres used in the heat treatments of metals is discussed. The production methods and the typical uses of the gas atmospheres are also treated. The costs of the in-situ atmospheres are compared to those of the conventional generator gas atmospheres. Then energy costs are especially taken into account. The energy costs as well as the total heat treatment costs can be reduced by avoiding unneccessary gas feed into the furnaces and by optimising the heat treatment procedures. High quality furnaces, in-situ atmospheres and a good process control make it possible to minimize the energy and gas consumptions.

47844 **High-resolution photoemission study of the electronic structure of the noble-metal (111) surfaces.** Kevan, S.D.; Gaylord, R.H. (Physics Department and Materials Science Institute, University of Oregon, Eugene, Oregon 97403-1274). *Physical Review [Section] B: Condensed Matter;* **36**: No. 11, 5809-5818(15 Oct 1987).

High-resolution angle-resolved photoemission studies of the (111) surfaces of copper, silver, and gold are reported which investigate in detail the properties of the intrinsic surface states located in the projected sp-band gaps at the center of the surface Brillouin zones. Accurate two-dimensional energy dispersion relations are reported for each surface state and are quantified in terms of effective masses at the surface Brillouin-zone center. The masses for the three metals are found to be remarkably similar when normalized to the effective mass of the lower edge of the bulk continuum. The decay length of the surface state wave function into the surface was determined for all three surfaces. These results are expressed in terms of an effective mass of the complex dispersion relation within the projected band gap. In accord with our previous results on the copper state, these effective masses are found to be anomalously large by approximately a factor of 2 relative to expectations based on effective mass theory coupled to first-principles bulk band calculations. An explanation of this anomaly involving the nonorthogonality of effective-mass-theory-derived states is explored. All experimental results are compared to the predictions of recent self-consistent surface electronic structure calculations for these surfaces.

47845 **Polarization-analysis study of the atomic and spin-pair correlations in Ni/sub 0.76/Mn/sub 0.24/.** Cable, J.W.; Nicklow, R.M.; Tsunoda, Y. (Oak Ridge National Laboratory, Solid State Division, Oak Ridge, Tennessee 37831). *Physical Review [Section] B: Condensed Matter;* **36**: No. 10, 5311-5315(1 Oct 1987). Contract AC05-84OR21400.

Neutron diffuse scattering measurements were made on single-crystal Ni/sub 0.76/Mn/sub 0.24/ to determine the atomic and spin-pair correlations in the reentrant spin-glass state. The nuclear and magnetic diffuse scattering were separated by polarization analysis at T = 10 K in a field of 8.1 kOe applied parallel to Q. The nuclear cross section shows diffuse peaks at (100) and (110) due to atomic short-range order (ASRO) with a range of about $3a_0$. The ASRO parameters for this quenched alloy were determined to 16 shells; these show a preference for like even-shell and unlike odd-shell neighbors. In the experimental geometry, the magnetic cross section determines the correlations between spin components transverse to the applied field, or magnetization direction. The magnetic short-range-order parameters alternate in sign for the first four shells and then remain positive at larger distances. This unusual result corresponds to the coexistence of short-range antiferromagnetic order with both short- and long-range ferromagnetic order.

47846 **Electronic structure and magnetic behavior of UMn_2 and UFe_2.** Boring, A.M.; Albers, R.C.; Schadler, G.H.; Lawson, A.C.; Weinberger, P.; Christensen, N.E. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] B: Condensed Matter;* **36**: No. 10, 5507-5511(1 Oct 1987).

The electronic structure of UMn_2 and UFe_2 has been determined using the first-principles self-consistent spin-polarized scalar-relativistic linear muffin-tin-orbital method. The calculations were performed at several lattice spacings for these materials in the C15 (cubic Laves phase) crystal structure. In agreement with experimental data it is found that UMn_2 is almost nonmagnetic (small moments on the sites) whereas in UFe_2 both U and Fe sites have appreciable moments. Furthermore, the magnetism in these systems is determined by exchange splitting and not by charge-transfer effects. The calculated moments in UFe_2 are larger at the U sites than those seen experimentally. The total moment in UFe_2 is somewhat insensitive to changes in lattice spacing (over the limited range determined) while the moments on individual sites are very sensitive to this variation.

47847 **Electronic structure of UPd/sub 3/ - a localized f compound.** Norman, M.R.; Oguchi, T.; Freeman, A.J. (Argonne National Lab., IL, USA. Materials Science Div.; Northwestern Univ., Evanston, IL, USA. Dept. of Physics and Astronomy). *Journal of Magnetism and Magnetic Materials;* **69**: No. 1, 27-33(Oct 1987). Contract W-31-109-ENG-38.

Various experiments on UPd/sub 3/, the analogue of the heavy fermion superconductor, UPt/sub 3/, have ascertained that there are two f electrons per U which are localized in a magnetic singlet state. Recently, both photoemission (PES) and de Haas-van Alphen (dHvA) experiments have been reported on UPd/sub 3/. To complement this experimental work, local density energy band calculations have been performed on UPd/sub 3/ where the f electrons have been treated as core states. The resulting density of state is found to be in good agreement with photoemission data. The theoretical Fermi surface is found to be more complex than current dHvA data indicate, but one can still unambiguously assign theoretical extremal orbits to the experimental data. Thus again, the data is consistent with a local f/sup 2/ configuration. Since the band calculations can explain the dHvA data in heavy fermion UPt/sub 3/ with the f electrons treated as band states, one finds that the Kohn-Sham ansatz for treating the f electrons and Bloch states breaks down between these two cases. This finding is confirmed by recent U(Pd/sub x/Pt/sub 3-x/) alloy experiments which show a sudden decrease in the specific heat coefficient when alloying these two compounds.

47848 **Two magnetically different, closely lying states of fcc iron grown on copper (100).** Montano, P.A.; Fernando, G.W.; Cooper, B.R.; Moog, E.R.; Naik, H.M.; Bader, S.D.; Lee, Y.C.; Darici, Y.N.; Min, H.; Marcano, J.; and others. (Department of Physics, West Virginia University, Morgantown, West Virginia 26506). *Physical Review Letters;* **59**: No. 9, 1041-1044(31 Aug 1987).

Two closely lying (in energy) states of fcc iron grown on copper (100) have been identified by magneto-optic and photoemission experiments. The as-grown state at 460 K exhibits in-plane surface ferromagnetism in magneto-optic measurements. Ferromagnetism parallel to the plane is not observed for the room-temperature state; its absence is supported by a comparison of our calculated and measured work functions and by the photoemission results. LEED shows expanded interplanar spacing at the surface. The temperature behavior and effect of fresh iron deposition indicate that the thermal transition between the two states is first order.

47849 **Comment on "Sensitivity of the conductance of a disordered metal to the motion of a single atom: Implications for 1/f noise".** Pelz, J.; Clarke, J. (Department of Physics, University of California, Materials and Molecular Research Division, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Physical Review Letters;* **59**: No. 9, 1061-1061(31 Aug 1987). Contract AC03-76SF00098.

A Comment on the Letter by Shechao Feng, Patrick A. Lee, and A. Douglas Stone, Phys. Rev. Lett. 56, 1960 (1986).

47850 **Planarization of metal films for multilevel interconnects.** Tuckerman, D.B. (to Dept. of Energy, Washington, DC). US Patent 4,681,795. 21 Jul 1987. Filed date 23 Aug 1985. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

This patent describes an electrical interconnection structure comprising aluminum or aluminum-silicon alloy layers separated by dielectric layers. Each aluminum or alloy layer has been planarized to form a flat surface by eliminating any oxide coating of the aluminum or alloy, forming a passivating and antireflection coating of silicon on the aluminum or alloy. Heating is applied to momentarily melt the layer to form a flat surface prior to the formation of an additional dielectric layer. The metal layers have been patterned after planarization according to a preselected pattern and interconnected through the dielectric layers.

47851 **Collapse of defect cascades to dislocation loops.** Kirk, M.A.; Robertson, I.M.; Vetrano, J.S.; Jenkins, M.L.; Black, T.J.; English, C.A. (Argonne National Lab., IL, USA. Materials Science and Technology Div.; Illinois Univ., Urbana, USA; Oxford Univ., UK; UKAEA Atomic Energy Research Establishment, Harwell). *Journal of Nuclear Materials;* **149**: No. 1, 21-28(Jun 1987). (CONF-860421—). Contract W-31-109-ENG-38;AC02-76ER01198.

From 2. international conference on fusion reactor materials (ICFRM-2); Chicago, IL, USA (13 Apr 1986).

We describe a number of experiments that we have recently performed to investigate the collapse of defect cascades to dislocation loops. This important ion and neutron irradiation phenomenon has been studied with in situ ion bombardment using the High Voltage Electron Microscope-Ion Accelerator Facility at Argonne National Laboratory in Cu/sub 3/Au, Cu, and Fe at temperatures of 30 and 300 K and in Ni at 30, 300 and 600 K. These experiments have demonstrated that individual defect cascades collapse to dislocation loops athermally at 30 K in some materials (Ni, Cu and Cu/sub 3/Au), while in Fe overlapping of cascades is necessary to produce dislocation loops. A slight sensitivity to the irradiation temperature is demonstrated in Cu/sub 3/Au and Fe, and a strong dependence on the irradiation temperature is seen in Ni. This phenomenon of cascade collapse to dislocation loops in metals at 30 K provides an understanding for previous neutron irradiation data. The more detailed dependencies of the collapse probability on material, temperature, bombarding ion dose, ion energy and ion mass contribute much information to a thermal spike model of the collision cascade which we will describe.

47852 **Dissolution of nitride precipitates in iron by low-dose neutron irradiation.** Robertson, I.M.; English, C.A.; Jenkins, M.L. (Illinois Univ., Urbana, USA. Dept. of Metallurgy and Mining Engineering; Illinois Univ., Urbana, USA. Materials Research Lab.; UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.; Oxford Univ., UK. Dept. of Metallurgy and Science of Materials). *Radiation Effects;* **102**: No. 1-4, 53-68(1987).

The microstructural changes brought about by irradiating α-iron containing a distribution of platelet α' -nitrite precipitates with fast neutrons at 355 K are described. By a dose of 4 x 10^{22} neutrons m^{-2} (E > MeV) a small number of precipitates had partially dissolved and appeared as regions of undisturbed platelet surrounded by rafts of small precipitates. At a dose of 7.5 x 10^{23} n m^{-2} no larger precipitates remained and a homogeneous population of small dislocation loops and precipitates was observed, whilst at 8.4 x 10^{23}n m^{-2} no visible damage or precipitation remained. Post-irradiation annealing at 593 K of foils irradiated to a dose of 4 x 10^{23} n m^{-2} gave rise to dislocation loops and precipitates. At annealing temperatures below 546 K no damage was observed at this dose. This complex pattern of behaviour is discussed in terms of cascade dissolution of the large precipitates, followed by the formation of nitrogen-point defect complexes, and the re-precipitation at room temperature after irradiation of any nitrogen that is not trapped.

47853 **Normal incidence reflection multilayer optics for solar soft x-ray/extreme ultraviolet (XUV) observations.** Lindblom, J.F.; Walker, A.B.C.; Barbee, T.W. Jr. (Center for Space Science and Astrophysics, Stanford Univ., ERL, Stanford, CA 94305). pp 11-19 of X-ray imaging II. Knight, L.V.; Bowen, D.K. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-860880—).

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

Normal incidence reflection multilayer optics show promise in enabling high spatial resolution (better than 1 arcsec) and low to moderate spectral resolution ($\lambda/\Delta\lambda \simeq 8$ - 200) imaging in the soft X-ray/XUV spectral regime (40 - 300 A). In preparation for a Solar X-RAY/XUV Sounding Rocket observation in late 1986 which will utilize normal incidence reflection X-ray optics, several multilayer coatings have been deposited on concave and convex spherical surfaces. The coatings are tungsten-carbon and molybdenum-silicon multilayers and are designed for normal incidence reflection at wavelengths ranging from 44 A to 304 A. The multilayers have been characterized in the laboratory in normal and glancing incidence modes using 1.54 A to 114 A radiation. In addition to measuring spectral resolution and absolute reflectivities, multilayer-coated optics have been successfully tested in the imaging mode. This paper reviews the measured characteristics of the multilayer coatings and optics and will describe the optical configurations planned for the upcoming solar observation.

3602 Ceramics, Cermets, And Refractories

REFER ALSO TO CITATION(S) 47573, 47807, 47894, 47919, 47983, 48119, 48134, 48134, 48135, 48135, 48140, 48160, 48160, 48991

47854 **(AD-A—182791/4/XAB) Method for dynamic fracture initiation testing of ceramics.** Duffy, J.; Suresh, S.; Cho, K.; Bopp, E.R. (Brown Univ., Providence, RI (USA). Div. of Engineering). May 1987. 28p. NTIS, PC A03/MF A01.

An experimental method is described whereby the dynamic fracture initiation toughness of ceramics and ceramic composites can be measured in pure tension or pure torsion at stress intensity factor rates of 100,000 to 1,000,000 MPA sq rt m/s. In this procedure, circumferentially-notched cylindrical rods are subjected to uniaxial cyclic compression at room temperature to introduce a self-arresting, concentric Mode I fatigue pre-crack, following the technique presented by Suresh et al. (1987) and Suresh and Tschegg (1987). Subsequently, dynamic-fracture initiation is effected by stress-wave loading with a sharp-fronted pulse which subjects the specimen to a dynamic load inducing either Mode I or Mode III fracture. Instrumentation appropriate to the loading mode provides a record of average stress at the fracture site as a function of time. The capability of this method to yield highly reproducible dynamic fracture initiation toughness values for ceramics is demonstrated with the aid of experiments conducted on a polycrystalline aluminum oxide.

47855 **(BNL—40072) Structure-property relationships for $RBa_2Cu_3/O/sub\ x/$ phases.** Torardi, C.C.; McCarron, E.M.; Subramanian, M.A.; Horowitz, H.S.; Michel, J.B.; Sleight, A.W. (Du Pont de Nemours (E.I.) and Co., Wilmington, DE (USA). Central Research and Development Dept.; Brookhaven National Lab., Upton, NY (USA)). 1987. Contract AC02-76CH00016. 7p. (CONF-870802—16). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014440.

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

The structures of several 1-2-3 compounds, e.g., $YBa_3Cu_3O_7$, have been refined from powder neutron diffraction data collected at 298°K. Orthorhombic symmetry was found for the superconducting phases $NdBa_2Cu_3O/sub\ 6.85/$, $YBa_2Cu_3O/sub\ 6.91/$, and

$ErBa_3Cu_3O$/sub 6.99/. The short Cu-O distance of about 1.85 A decreases with increasing size of the rare earth cation, but the average Cu-O distance in the chains remains nearly constant. Refinement of a reduced YBa_3Cu_3O/sub 7-x/ phase shows that a tetragonal $YBa_2Cu_3O_6$ composition can be achieved before structural collapse. This phase is semiconducting and not superconducting. We have also prepared a sample of $YBa_2Cu_3O_7$ with the tetragonal 1-2-3 structure where oxygens have not ordered in a way to produce the linear (Cu-O)/sub n/ chains. This form of $YBa_2Cu_3O_7$ is not superconducting above 4.2°K. The structure of La/sub 1.6/Ba/sub 1.6/Cu_3O/sub 7.33/ with the tetragonal 1-2-3 structure was refined and again there are no linear (Cu-O)/sub n/ chains and no superconductivity. On the basis of these six structural refinements, we tentatively conclude that the (Cu-O)/sub n/ chains are required for superconductivity. 5 refs., 1 fig., 4 tabs.

47856 **(CONF-870725—10) Analytical electron microscopy characterization of boron in sintered α-SiC.** More, K.L.; Bentley, J.; Carter, C.H. Jr.; Davis, R.F. (Oak Ridge Associated Universities, Inc., TN (USA); Oak Ridge National Lab., TN (USA); North Carolina State Univ., Raleigh (USA). Dept. of Materials Engineering). 1987. Contract AC05-84OR21400. 10p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87012532.

From 22. annual meeting of the Microbeam Analysis Society; Kailua-Kona, HI, USA (13 Jul 1987).

The final microstructure of α-SiC sintered with the addition of densification aids of elemental carbon and B_4C consists of ~8 μm α-SiC grains, large (>1 μm) B_4C grains possibly containing a small amount of silicon, and free carbon (mostly graphite). The sintering of the SiC with a boron-containing phase causes the α-SiC grains to become saturated with boron. During annealing experiments and high temperature, constant stress creep experiments, small (10 to 20 nm) B_4C precipitates nucleate and grow within the α-SiC grains. This precipitate formation was independent of applied stress. No boron was detected on grain boundaries in the starting material or material which had been annealed or deformed. 6 refs., 7 figs.

47857 **(CONF-8705103—11) Processing and properties of SiC/Nicalon composites.** Lowden, R.A.; Caputo, A.J.; Stinton, D.P.; Besmann, T.M.; Morris, M.D. (Oak Ridge National Lab., TN (USA)). May 1987. Contract AC05-84OR21400. 26p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013885.

From Fossil energy materials program conference; Oak Ridge, TN, USA (19 May 1987).

A statistically designed experiment was performed to evaluate the effects of process variables on fiber-reinforced SiC composites fabricated by chemical vapor infiltration. Response surface methodology was applied to study the influence of temperature, pressure, reactant supply rate, and gas ratios on the deposition process and the properties of the produced material. Deposition temperature and total gas flow rates had inverse effects on density and strength, while the effect of pressure was statistically insignificant. Low H_2:CH_3SiCl_3 ratios evoked a positive response in all dependent variables. 42 refs., 7 figs., 4 tabs.

47858 (DOE/ER/60420—1, pp 377-392) **Band description of materials with localizing orbitals.** Koelling, D.D. (Argonne National Lab., IL). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2). Contract W-31-109-ENG-38.

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Density functional theory is a form of many body theory that maps the problem onto an equivalent single particle-like system by limiting to the ground state (or some limited ensemble). So it should be surprising that this ground state theory could have any relevance whatsoever to the excitation properties of a material, and yet it does when used carefully? However, the most interesting materials involve active orbitals that are at least partially localized in space, and this has profound effects both on the ground state and the excitation spectrum. The authors long term interest is in Ce and actinide compounds, where the popular concerns are mixed valence, heavy fermions, and the various forms of magnetic transitions. Band structure calculations can give a great deal of information concerning the mechanisms and degree of the localization as will be shown by examples using the Ce and U L_3 structured materials and the Ce cubic Laves phase materials. There are some difficulties due to an incomplete knowledge of the functions involved that causes an underestimate of the local character. This will be illustrated and discussed.

47859 **(LBL—23872) Specific heat of the high T/sub c/ superconductors $(La,M)_2CuO_4$ and $YBa_2Cu_3O_7$ in magnetic fields.** Phillips, N.E.; Fisher, R.A.; Lacy, S.E.; Marcenat, C.; Olsen, J.A.; Ham, W.K.; Stacy, A.M.; Gordon, J.E.; Tan, M.L. (Lawrence Berkeley Lab., CA (USA)). Aug 1987. Contract AC03-76SF00098. 10p. (CONF-870881—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014680.

From 18. conference on superconductivity in highly correlated fermion systems; Sendai, Japan (31 Aug 1987).

The specific heats, C, of the high T/sub c/ superconductors $YBa_2Cu_3O_7$, La/sub 1.85/Ca/sub 0.15/CuO_4 and La/sub 1.85/Sr/sub 0.15/CuO_4 have been measured from 0.4K to above the superconducting transition temperature in magnetic fields, H, from 0 to 7T. From measured changes in C with H, values of $\gamma(H) = [C(H)/T]$/sub T=0/ and $\Delta C/T$/sub c/ = [C/sub s/-C/sub n/)/T]/sub T=T/sub c// have been evaluated. These results have been used to estimate the normal state γ, the fraction of the sample that is superconducting in zero field, f/sub s/, and the value of the upper critical field, [H/sub c2/]/sub T=0/. 4 refs., 3 figs.

47860 (MLM—3419, pp 4-8) **Processing and characterizing glass-ceramics.** Haws, L.D. Feb 1987. NTIS, PC A03/MF A01. File Number DE87008396.

In Materials science and characterization: Technology update-87.

During the past five to six years Mound has been developing novel glass-ceramic process technologies to produce weapon components with improved performance characteristics. As an example of performance, one of the glass-ceramic components reliably contains 150,000 psi, the internal dynamic pressure produced during operation.

47861 **(N—87-25017) Boron nitride: composition, optical properties and mechanical behavior.** Pouch, J.J.; Alterovitz, S.A.; Miyoshi, K.; Warner, J.D. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Apr 1987. 9p. (NASA-TM—89849; E—3514; NAS—1.15:89849; CONF-870438—34). NTIS, PC A02/MF A01.

From Spring meeting of the Materials Research Society; Anaheim, CA, USA (21 Apr 1987).

A low energy ion beam deposition technique was used to grow boron nitride films on quartz, germanium, silicon, gallium arsenide, and indium phosphate. The film structure was amorphous with evidence of a hexagonal phase. The peak boron concentration was 82 at %. The carbon and oxygen impurities were in the 5 to 8 at % range. Boron-nitrogen and boron-boron bonds were revealed by x-ray photoelectron spectroscopy. The index of refraction varied from 1.65 to 1.67 for films deposited on III-V compound semiconductors. The coefficient of friction for boron nitride in sliding contact with diamond was less than 0.1. The substrate was silicon.

47862 **(SAND—87-0937C) Shock-induced chemical synthesis of phases similar to the high temperature superconductor oxides.** Morosin, B.; Graham, R.A.; Venturini, E.L.; Ginley, D.S.; Hammetter, W.F. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 5p. (CONF-870753—75). NTIS, PC A02. File Number DE87013725.

From 5. topical conference of the American Physical Society on shockwaves in condensed matter; Monterey, CA, USA (20 Jul 1987).

Various mixtures of metal oxides of compositions which when furnace reacted will yield known high temperature superconductor oxides have been subjected to a range of shock loading conditions to determine parameters leading to their shock-induced chemical synthesis. Recovered samples show x-ray diffraction lines

consistent with the formation of the K_2NiF_4 structure type crystallographic phase for La/sub 1.85/Sr/sub 0.15/CuO_4. Studies on the YBaCu system yielded diffraction lines consistent with those for a small amount of $YBa_2Cu_3O_7$. 3 refs., 3 figs., 1 tab.

47863 **Theoretical study of BN, BP, and BAs at high pressures.** Wentzcovitch, R.M.; Cohen, M.L.; Lam, P.K. (Department of Physics, University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 11, 6058-6068(15 Oct 1987).

The present work employs the total-energy pseudopotential technique to calculate the relative stabilities at high pressures of the zinc-blende β-Sn, and rocksalt structures in the series of compounds BN, BP, and BAs. For compressed volumes these compounds are shown to favor the rocksalt phase over β-Sn, even though BP and BAs are the least ionic of the III-V zinc-blende compounds. This indicates that the stability of the rocksalt structure under pressure depends on more than just the ionicity factor. The structural preference is analyzed in terms of charge densities. The charge rearrangements at different volumes are also studied. We find that for BN the charge associated with B decreases with volume compression while the charge associated with N increases. In BP and BAs the opposite trend is observed, with P and As behaving like B in BN. BN appears to behave like a typical III-V compound semiconductor in its charge distribution while BP and BAs are anomalous cases which can be characterized by reversing the standard assignments for the anions and cations in these compounds.

47864 **Optical detection of a hydrogen complex responsible for the F phosphorescence in thermochemically reduced MgO crystals.** Orera, V.M.; Chen, Y. (Instituto de Ciencias de Materiales de Aragon, Universidad de Zaragoza, Zaragoza, 50009, Spain). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 11, 6120-6124(15 Oct 1987).

A hydrogen complex denoted as [H/sub x/ $^-$]^0 has been detected using optical-absorption techniques. The local mode of the hydrogen in the anion sublattice resonates at 1037 cm/sup -1/ and a broad absorption peaking at 400 nm characterizes the electronic transition of this complex. It is shown to be the predominant electron trap involved in the photoconversion process of F→F$^+$ centers. It is metastable at room temperature, giving rise to the F phosphorescence (the thermoluminescence which peaks at 260 K). We further demonstrate that this complex is not the defect identified previously as an H/sup 2-/ ion by electron paramagnetic resonance at low temperature.

47865 **Stability analysis of special-point ordering in the basal plane of YBa_2Cu_3O/sub 7-//sub δ/.** de Fontaine, D.; Wille, L.T.; Moss, S.C. (Lawrence Berkeley Laboratory and Department of Materials Science 20 Mineral Engineering University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 10, 5709-5712(1 Oct 1987).

It is shown that the Cu-O basal plane of YBa_2Cu_3O/sub 7-//sub δ/ can undergo three types of ordering wave instabilities at the k points <0,0>, <1/2,0> or <1/2,1/2>, depending on the values of the effective pair interactions between filled and empty oxygen sites. The <0,0> instability gives rise to the observed chains of oxygen atoms along either the a or the b axis of the crystals. The <1/2,0> and <1/2,1/2> instabilities produce doubling and quadrupling of the unit cell, respectively. Comparison with experiments suggests the necessity for interactions beyond nearest neighbors.

47866 **Structural and superconducting properties of orthorhombic and tetragonal YBa_2Cu_3O/sub 7-//sub x/: The effect of oxygen stoichiometry and ordering on superconductivity.** Jorgensen, J.D.; Veal, B.W.; Kwok, W.K.; Crabtree, G.W.; Umezawa, A.; Nowicki, L.J.; Paulikas, A.P. (Materials Science Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 10, 5731-5734(1 Oct 1987).

The structural and superconducting properties of orthorhombic and tetragonal YBa_2Cu_3O/sub 7-//sub x/ have been determined for a wide range of stoichiometries (0.3<x<0.7). In the orthorhombic phase, T/sub c/ decreases smoothly as x increases and reaches zero at the orthorhombic-to-tetragonal transition. Tetragonal YBa_2Cu_3O/sub 7-//sub x/ is not superconducting at any stoichiometry. This systematic depression of T/sub c/ is correlated with the decrease in the oxygen content which alters the electronic structure of the Cu-O networks.

47867 **Effect of magnetic impurities on high-temperature superconductivity in La/sub 1.85/Sr/sub 0.15/CuO_4.** Crabtree, G.W.; Kwok, W.K.; Umezawa, A.; Soderholm, L.; Morss, L.; Alp, E.E. (Materials Science and Chemistry Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 10, 5258-5262(1 Oct 1987).

We have investigated the effect of magnetic impurities on the two-dimensional high-T/sub c/ superconductor La/sub 1.85/Sr./sub 0.15/CuO_4 by replacing La with Nd. We find a decrease in T/sub c/ and dH/sub c/$_2$/dTchemical bond/sub =/ and an increase in the normal-state resistivity with increasing Nd content. We use the Werthamer, Helfand, and Hohenberg equations to derive the effect of an exchange field, magnetic polarization, nonmagnetic impurity scattering, and changes in the density of states on T/sub c/ and dH/sub c/$_2$/dTchemical bond/sub =/. We find no evidence of an exchange interaction between the magnetic moments and the conduction electrons. We explain the changes in the superconducting properties in terms of the van Hove singularity in the density of states near the Fermi level.

47868 **Long-range order in V_2H near the β-ϵ phase transition.** Schoenfeld, B.; Moss, S.C.; Kjaer, K. (Institut fuer Angewandte Physik, Eidgenoessische Technische Hochschule Zuerich, 8093 Zuerich, Switzerland). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 10, 5466-5471(1 Oct 1987).

The integrated intensity I of h/2 0 h/2-bar superstructure reflections has been measured with x rays for a single crystal of V_2H. Just below the critical temperature T/sub c/ of the β-ϵ phase transition, I varies as (1-T/T/sub c/)^{2}/sup β/ with $\beta = 0.153 +- 0.007$, increasing to $\beta = 0.17$ and 0.20 when referred to a rigid volume and c lattice parameter, respectively, through a lattice-expansion correction. By comparing heating and cooling runs the second-order character of this phase transition has been demonstrated. A shift of T/sub c/, however, was observed when data were taken without first thermally cycling the crystal close to T/sub c/.

47869 **Photoemission search for the superconducting energy gap of high-T/sub c/$YBa_2Cu_3O_7$.** Moog, E.R.; Bader, S.D.; Arko, A.J.; Flandermeyer, B.K. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 10, 5583-5585(1 Oct 1987). Contract W-31-109-ENG-38.

Photoemission data ($h\nu = 21.2$ eV) are reported for the high-T/sub c/ superconductor $YBa_2Cu_3O_7$ above and well below T/sub c/ and examined for effects due to the formation of the superconducting energy gap. To guide expectations, simulations are also presented based on a BCS quasiparticle excitation expression broadened by a 30-meV experimental resolution. Comparison of the experimental Fermi-edge spectra with the calculations indicates either that the surface region probed is not superconducting or that the superconductivity is in the extreme gapless limit.

47870 **Thermal properties of the high-T/sub c/ superconductors La/sub 1.85/Sr/sub 0.15/CuO_4 and $YBa_2Cu_3O_7$.** Collocott, S.J.; White, G.K.; Dou, S.X.; Williams, R.K. (Commonwealth Scientific and Industrial Research Organization, Division of Applied Physics, Lindfield, Australia 2070). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 10, 5684-5685(1 Oct 1987).

The heat capacity C/sub p/ of samples of La/sub 1.85/Sr/sub 0.15/CuO_4 and $YBa_2Cu_3O_7$ have been measured from 1.5 to 40 K, and the linear thermal expansivity α of La/sub 1.85/Sr/sub 0.15/CuO_4 measured in the range 2 to 80 K. The heat capacities show similar temperature dependencies and magnitudes (per gram) with a linear (tunnelling?) term dominating below 4 K. α also

shows a comparable T term below 4 K and both C/sub p/ and α show a small discontinuity of ≅1% near T/sub c/≅34 K.

47871 **Superconductivity in H/sub x/$YBa_2Cu_3O_7$.** Reilly, J.J.; Suenaga, M.; Johnson, J.R.; Thompson, P.; Moodenbaugh, A.R. (Department of Applied Science, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review [Section] B: Condensed Matter;* **36**: No. 10, 5694-5697(1 Oct 1987).

The preparation of H/sub x/$YBa_2Cu_3O_7$ by the direct reaction with hydrogen gas is described. The expansion of the original orthorhombic unit cell, as determined by x-ray diffraction, indicates that the system forms a hydrogen solid solution up to x—0.2; at higher H contents a hydrogen-rich phase is precipitated. The solid-solution phase exhibits a superconducting transition at —94 K, which was usually slightly higher than the original oxide. The H-rich phase(s), are not superconducting at 4 K or above. The maximum H content so far achieved corresponds to x = 5.9. The H-rich phases are stable at room temperature, at elevated temperatures (>473 K) they will decompose slowly under vacuum to form water and various solid products. They also slowly react upon exposure to room air.

47872 **NMR evidence for solid-fluid transition near 250 K of ^{3}He bubbles in palladium tritide.** Abell, G.C.; Attalla, A. (Mound Laboratory, Monsanto Research Corporation, Miamisburg, Ohio 45342). *Physical Review Letters;* **59**: No. 9, 995-997(31 Aug 1987).

Nuclear magnetic resonance relaxation times for ^{3}He in microscopic bubbles in 1-yr-old Pd^{3}H/sub 0.62/ have been measured in the range 100—320 K. The results provide evidence for the melting of He in the range 200—280 K and for He diffusion in solid He below 200 K. The observed melting temperatures give a mean He atom density, from which the ratio of He atoms to host atom vacancies is found to be 2.0. An activation energy for He diffusion has been obtained and its relationship to the observed mean melting temperature is compared with that found in bulk ^{3}He at much lower densities.

47873 **Effect of ZrO_2 inclusions on fracture properties of $MgCr_2O_4$.** Singh, J.P. (Argonne National Lab., IL, USA). *Journal of Materials Science;* **22**: No. 8, 2685-2690(Aug 1987).

Refractory linings for the main pressure vessel of slagging coal gasifiers are subjected to very corrosive environments (molten slag) and to thermal shock caused by the temperature fluctuations. These conditions may result in refractory failure by corrosion, cracking and spalling. In view of the good resistance to corrosion by molten slag, high-chromia refractories appear to be very promising candidates for slagging coal gasifier applications. Unfortunately, these high-chromia refractories have relatively poor resistance to thermal-shock fracture. The effects of unstabilized ZrO_2 inclusions on the strength, fracture surface energy and thermal-shock resistance of $MgCr_2O_4$ have been evaluated. The improvement in mechanical properties, specifically the four-fold increase in fracture surface energy, resulted in a substantial increase in thermal-shock resistance of $MgCr_2O_4$-ZrO_2 composites as indicated by the results of thermal-shock experiments.

47874 **Structural and dynamical studies of δ-Bi_2O_3 oxide ion conductors. IV. An EXAFS investigation of (Bi_2O_3)/sub 1-x/(M_2O_3)/sub x/ for M = Y, Er, and Yb.** Battle, P.D.; Catlow, C.R.A.; Chadwick, A.V.; Cox, P.; Greaves, G.N.; Moroney, L.M. (Leeds Univ., England). *Journal of Solid State Chemistry;* **69**: No. 2, 230-239(Aug 1987). Contract AS05-80ER10742.

The local structural environments of Bi^{3+} and dopant cations in the fluorite-structured solid solutions (M_2O_3)/sub x/(Bi_2O_3)/sub 1-x/ (M = Y, Er, Yb) have been studied using extended x-ray absorption fine structure techniques. The results show that the Bi-O shell is heavily disordered with an asymmetric radial distribution function. The Bi^{3+} ion tends to be displaced from its centrosymmetric, cube center site. The first coordination shell of the dopant is comparatively ordered. Varying the dopant cation has a small effect on the local structural environment and increasing the dopant concentration causes a small increase in the degree of local order. Data obtained over a range of temperatures show that the large anisotropy in the Bi-O shell is attributable to static displacements from the perfect lattice sites. The degree of correlation between the thermal vibrations of the anion sublattice and those of the Bi atoms differs from that observed between those of the anion sublattice and the dopant atoms; the significance of this for ionic conductivity is discussed.

47875 **Structure of surface tungsten oxide species in the WO_3/Al_2O_3 supported oxide system from x-ray absorption near-edge spectroscopy and Raman spectroscopy.** Horsley, J.A.; Wachs, I.E.; Brown, J.M.; Via, G.H.; Hardcastle, F.D. (Exxon Research and Engineering Co., Annandale, NJ). *Journal of Physical Chemistry;* **91**: No. 15, 4014-4020(16 Jul 1987).

The X-ray absorption near-edge spectra (XANES) of the L_1 tungsten edge in WO_3/Al_2O_3 samples indicate that the symmetry of the tungsten environment depends on both the surface coverage and the presence of coordinated water. At coverages of less than 1/3 monolayer, in the absence of coordinated water, the XANES spectrum indicates a distorted tetrahedral structure for the surface tungsten oxide species. Samples exposed to air at room temperature have water molecules coordinated to the surface tungsten oxide species and produce an octahedral site symmetry, but the water is removed by heating to 500°C. The Raman spectra of the WO_3/Al_2O_3 samples are consistent with a distorted tetrahedral tungsten oxide environment and, in addition, show features due to W=O and W-O-W bonds. These results suggest that the surface tungsten oxide is present as both isolated and dimeric tetrahedra. At coverages approaching a monolayer, in the absence of coordinated water, a significant fraction of the surface tungsten oxide sites appears to have a distorted octahedral environment in the XANES spectra. At this high coverage the effect of coordinated water molecules is much less evident than at low coverage. The Raman results, however, only provide information about the tetrahedral component because the Raman cross section of the tetrahedral tungsten oxide is much higher than the octahedral tungsten oxide. The Raman spectra show features of W=O and W-O-W bonds in the tetrahedral fraction of the surface tungsten oxide monolayer on alumina.

47876 **Unlubricated sliding wear of ceramic materials.** Levy, A.; Jee, N. (Lawrence Berkeley Lab., Univ. of California, Berkeley, CA). pp 459-476 of Wear of materials - 1987. Ludema, K.C. New York, NY; American Society of Mechanical Engineers (1987). (CONF-870476—).

From International conference on wear of materials; Houston, TX, USA (5 Apr 1987).

The potential use of thermal insulating ceramic coatings on the cylinder walls of diesel engines at elevated temperatures required that an understanding of the operative friction and wear mechanisms be gained. An investigation was carried out to determine the unlubricated sliding wear behavior of a number of thermal insulating oxide coatings in combination with carbide, boride, and mixed oxide coatings and carbide graphite fiber composites at room and elevated temperatures at 730°C. The coatings were applied up to several hundred microns thick by plasma spray and chemical vapor deposition (CVD) processes on flat washers and discs and tested at contact pressures up to 14 MPa to steady state wear conditions in a rotational, reversing motion. Wear rates, coefficients of friction and wear surface compositions and morphologies were determined. It was found that the binder metal in sprayed metal carbide composites had a dominant influence on the wear, more so than the composition of the carbide. Different wear surface morphologies and attendant wear rates occurred at each of the test temperatures. The shape of the deposited grains in the CVD coatings has a major effect on the wear rates; rounded grains being better than angular grains of the same material. A film formed on the TiB/sub 2/-mixed oxide pairs that could have a significant effect on their wear behavior.

47877 **Relaxation attenuation in Er/sub 0.187/Ho/sub 0.813/Rh/sub 4/B/sub 4/ and HoRh/sub 4/B/sub 4/.** Sun, K.J.; Sorbello, R.S.; Levy, M.; Maple, M.B.; Torikachvili, M.S. (Univ. of Wisconsin-Milwaukee, Milwaukee, WI). pp 1123-1126 of Proceedings of the IEEE 1986 ultrasonics symposium. Mc Avoy, B.R. Piscataway, NJ; IEEE Service Center (1987). (CONF-8611157—).

From IEEE ultrasonics symposium; Williamsburg, VA, USA (17 Nov 1986).

The temperature dependence of the ultrasonic attenuation of samples of Er/sub 0.187/Ho/sub 0.813/Rh/sub 4/B/sub 4/ and HoRh/sub 4/B/sub 4/ was measured at different frequencies. A bell-shaped maximum observed in each of the attenuation curves shifted to higher temperatures when the impressed frequency was increased. The maximum is believed to be a relaxation type attenuation maximum which is associated with the splitting of the ground state of the Ho/sup 3+/ ions. An expression which relates the attenuation to the oscillation of the energy levels of the Ho/sup 3+/ ions due to the propagation of an ultrasonic wave through the sample is derived. The experimental results qualitatively agree with this Debye equation. The temperature dependence of the relaxation time between the energy levels may be obtained from the experimental results by using this equation, and yields reasonable shifts in temperature for the attenuation maxima at different frequencies.

47878 **Fatigue behavior of partially stabilized zirconia ceramics.** Ferber, M.K.; Hine, T. (Dept. of Ceramic Engrg., Univ. of Illinois, Urbana, IL). pp 201-208 of Proceedings of the 24th automotive technology development contractors coordination meeting (P-197). Warrendale, PA; Society of Automotive Engineers (1986). (CONF-861002—).

From Automotive technology development contractors' coordination meeting; Dearborn, MI, USA (27 Oct 1986).

The time-dependent strength variations of two grades of MgO stabilized materials (Mg-PSZ) were measured as a function of temperature and applied stress level. The strength was determined using an interrupted fatigue (I.F.) test in which flexure samples were exposed at temperatures between 500 and 1000°C for times up to 1008 h. During testing, the applied stress was maintained at a percentage of the short-term strength value measured at the same T. The resulting I.F. data gave evidence of both strengthening and weakening processes. The dominant mechanism at a given temperature was primarily dictated by the stress level. In the present investigation, the fatigue behavior for two grades of Mg-PSZ was evaluated by measuring the time-dependent strength variations as a function of temperature and applied stress level. Changes in microstructure resulting from the high-temperature exposure were determined from subsequent ceramographic, SEM and TEM studies. In addition, x-ray diffraction and dilatometry measurements were used to examine time-dependent variations in the phase assemblage.

47879 **Tensile cyclic fatigue of alumina at room and elevated temperatures.** Liu, K.C.; Brinkman, C.R. (Oak Ridge National Lab., Oak Ridge, TN). pp 191-200 of Proceedings of the 24th automotive technology development contractors coordination meeting (P-197). Warrendale, PA; Society of Automotive Engineers (1986). (CONF-861002—). Contract AC05-84OR21400.

From Automotive technology development contractors' coordination meeting; Dearborn, MI, USA (27 Oct 1986).

A series of tensile fast fracture and cyclic fatigue tests were performed on commercial alumina at room temperature, using the hydraulic self-aligning grip system developed at Oak Ridge National Laboratory (ORNL). Alumina was selected for testing as a model brittle material for the purpose of demonstration and evaluation of room-temperature testing capability of the new grip system. A limited number of cyclic tension-tension tests were performed to characterize the fatigue behavior of this material. Test results showed excellent reproducibility and also showed that the cyclic fatigue behavior of alumina at room temperature can be analytically described by a power law relationship between the fatigue strength and cyclic fatigue life similar to that generally observed for most metal alloys. The tensile strength obtained for 94% alumina was lower than the flexural strength as expected but only by about 11%. Good specimen alignment was observed based on the measurements taken from strain gages mounted on ceramic specimens, indicating a negligible bending stress in the gage section (less than 0.5% of the applied tensile stress).

47880 **Thick thermal barrier coatings.** Larson, H.J. (Caterpillar Inc.). pp 73-82 of Proceedings of the 24th automotive technology development contractors coordination meeting (P-197). Warrendale, PA; Society of Automotive Engineers (1986). (CONF-861002—).

From Automotive technology development contractors' coordination meeting; Dearborn, MI, USA (27 Oct 1986).

The overall objective of the DOE/NASA Heavy Duty Transport Technology Program is to develop a technology base that can be applied to the design of fuel efficient, low heat rejection engines. The program approach is to develop key component technologies and evaluate the engine components by running proof of concept engines. The use of ceramic thermal barrier coatings on diesel engine components is one option being evaluated for the design of low heat rejection engines. The objective of contract DEN3-332 is to design and demonstrate the durability of thick thermal barrier coatings with an overall thermal conductance of 0.5 Btu/hr in /sup 2/°F (408 Watts/m/sup 2/°C). A .100 inch (2.5 mm) thick plasma sprayed zirconia coating will meet this thermal conductance goal. Zirconia thermal barrier coatings (TBC) are applied to the piston, valves and cylinder head fire deck for evaluation in a single cylinder engine to confirm the performance predictions and demonstrate the coating system durability. The plasma sprayed components run for 100 hours at the power rating and in-cylinder conditions representative of advanced on-highway truck diesel engines.

3606 Other Materials

REFER ALSO TO CITATION(S) 47322, 47366, 47572, 47807, 47854, 47863, 47954, 47983, 47999, 48136, 48138, 48160, 48160, 48283, 48997, 48998

47881 **(AD-A—181980/4/XAB) Development of a small-scale test apparatus for the evaluation of thermal-barrier materials. Technical communications report.** Hiltz, J.A.; Veinot, D.E. (Defence Research Establishment Atlantic, Dartmouth, Nova Scotia (Canada)). Apr 1987. 31p. (DREA-TC—87/307). NTIS, PC A03/MF A01.

A small-scale test apparatus was constructed and used to evaluate the relative ability of four thermal-barrier materials to protect aluminum from heat damage. The apparatus used 30 x 30 cm (1 ft x 1 ft) 0.64 cm (0.25 in) aluminum panels. Several configurations of the glass and ceramic fiber-cloth barrier materials (Startex 6N, Startex 4N, SilTemp, and Claretex 1925 B567) were tested to determine the degree of protection provided by the thermal-barrier materials. The results obtained with the small scale apparatus have been correlated with those obtained with a modified ASTM E119 apparatus at the Fire Research Section of the National Research Council of Canada. Although the results from the small-scale tests do not compare with those from the ASTM E119 test in an absolute sense, they give the same relative ranking of the ability of the barrier materials to protect aluminum from heat damage. This suggests that inexpensive small-scale testing can be used to screen and rank the ability of different materials and combinations of materials to protect an aluminum substrate from heat damage.

47882 **(AD-A—182133/9/XAB) Corrosion behavior of metal-matrix composites. Final report, June 1985-June 1986.** Paciej, R.C.; Argarwala, V.S. (Naval Air Development Center, Warminster, PA (USA). Air Vehicle and Crew Systems Technology Directorate). Feb 1987. 19p. (NADC—87029-60). NTIS, PC A02/MF A01.

Metal-matrix composites suffer from preferential corrosion because of their non-homogeneous composition and structure. In particular, aluminum alloy matrix materials are very susceptible to corrosion, when the dispersoid is a noble phase, such as SiC. This paper describes the pros and cons of what inadequate processing and fabrication can do to corrosion behavior of the composites.

47883 (AD-A—182321/0/XAB) Discontinuous reinforced MMC (metal-matrix composite) by improved sonic distribution of SiC into molten aluminum. Technical report (Final), 28 June 1985-28 February 1987. Orban, R.F.; Goddard, D.M. (Material Concepts, Inc., Columbus, OH (USA)). 28 Feb 1987. 66p. (MCI—86-0182). NTIS, PC A04/MF A01.

A month program investigated the use of sonic energy to form a discontinuous SiC/A1 metal-matrix composite system. Predicated on the previous Phase I SBIR effort, this Phase II program involved the use of a sonic transducer to distribute SiC particles into melts of molten aluminum. Although the program was plagued with the major problem of finding equipment that would operate under the necessary conditions, such a unit was identified and procured. Additions of 10 wt% were attempted with 520, 356, and pure aluminum. Greatest success was achieved with the 520 alloy, followed by the 356 alloy with successful additions of 10 and 7 wt%, respectively. Further, distribution of the particules was fairly uniform. Other alternative methods of producing discontinuous SiC/A1 were also investigated, including mixing with an impeller and use of a proprietary coating on the SiC particulate.

47884 (AD-A—182436/6/XAB) EPR (electron paramagnetic resonance) studies of defects and impurities in boron-implanted Hg/sub 1-x/Cd/sub x/Te. Technical report. Bowman, R.C.; Venturini, E.L. (Aerospace Corp., El Segundo, CA (USA). Chemistry and Physics Lab.). 22 May 1987. 23p. (TR—0086(6945-07)-2). NTIS, PC A02/MF A01.

Representative high-purity single crystals of Hg(1-x)Cd(x)Te were examined by electron paramagnetic resonance (EPR) to determine whether they contain Fe^{+3} impurities or defects. EPR spectra consistent with substitutional Fe^{+3} impurities were obtained from some CdTe samples, but no paramagnetic centers were observed in p-type Hg0.7Cd0.3Te. Since boron-ion implanation is commonly used to produce n-p junctions in HgCdTe during the fabrication of infrared sensor devices, paramagnetic damage centers are likely to form but have not been previously demonstrated. We report the observation of free-electron -like EPR signals in heavily 11B+ implanted CdTe and Hg0.7Cd0.3Te. These spectra have similar EPR characteristics to the so-called dangling-bond defects generated in ion-implanted Si and GaP. Although the identities of these defects in HgCdTe remain to be established, the effects of implant conditions and thermal treatments are briefly described.

47885 (AD-A—182437/4/XAB) Studies of boron implantation through photochemically deposited SiO_2 films on Hg/sub 1-x/Cd/sub x/Te. Technical report. Bowman, R.C.; Robertson, R.E.; Knudsen, J.F.; Downing, R.G. (Aerospace Corp., El Segundo, CA (USA). Chemistry and Physics Lab.). 22 May 1987. 23p. (TR—0086(6945-07)-3). NTIS, PC A02/MF A01.

Variable-temperature Hall and resistivity measurements were used to monitor the changes in carrier behavior in p-type Hg(1-x)Cd(x)Te when boron ions are implanted through photochemically deposited SiO_2. The formation of an n-type layer is demonstrated. Quantitative and nondestructive determination of the absolute ^{10}B concentration and distribution were obtained by the novel method of neutron-depth profiling. As expected, the boron distributions in the SiO_2 films and Hg(1-x)Cd(x)Te are strongly dependent upon the ion implant energy. However, negligible changes in the boron depth profiles were found after 200 C anneals. The present results are briefly related to the performance behavior of mid-wavelength infrared (MWIR) sensors produced via generic ion-implantation procedures.

47886 (BNL—40106) Hydrogen annealing of P/sub b/ and E' defect centers in oxidized silicon wafers. Li, Zheng; Fonash, S.J.; Caplan, P.J.; Poindexter, E.H. (Pennsylvania State Univ., University Park (USA); Brookhaven National Lab., Upton, NY (USA); Army Electronics Technology and Devices Lab., Fort Monmouth, NJ (USA)). 1987. Contract AC02-76CH00016. 10p. (CONF-8709121—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014293.

From 1. workshop on process-related electrically active defects in semiconductor-insulator systems; Research Triangle Park, NC, USA (1 Sep 1987).

The disposition of hydrogen and hydrogeneous species in the oxide of MOS devices is a major factor in resistance to hot-electron injection, high-voltage stress, and ambient radiation. There is a need for spectroscopically based modeling of the thermochemical generation and annealing of defects. This paper presents preliminary results on the hydrogen annealing of the P/sub b/ (.Si identical to Si_3) interface defect and the E' (.Si identical to O_3) oxide defect. 5 refs.

47887 (BNL—40243) Neutron diffraction analysis of $HRh[P(C_6H_5)_3]_4$. Bau, R.; Stevens, R.C.; McLean, M.; Koetzle, T.F. (Brookhaven National Lab., Upton, NY (USA); University of Southern California, Los Angeles (USA). Dept. of Chemistry). 1987. Contract AC02-76CH00016. 5p. (CONF-8708117—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014914.

From Neutron scattering symposium on advances and applications; Sydney, Australia (8 Aug 1987).

We have collected neutron diffraction data on a large single crystal of the title compound. The most surprising result is an extremely short Rh-H distance of 1.31(8) A, presumably caused by steric interactions involving the bulky triphenyl phosphine ligands. Crystallographic details: $HRh[P(C_6H_5)_3]_4 \cdot \frac{1}{2}C_6H_6$ crystallizes in the space group Pa3, with $a = b = c = 22.776(3)$ A, $Z = 8$. Data were collected at the Brookhaven High Flux Beam reactor at a temperature of -23°C, $\lambda = 1.15882(7)$ A^{-1}. Least-squares refinement (in which the phenyl rings were treated as rigid groups) resulted in an R factor [based on data with $f > 4\sigma(F)$] of 0.12 for 914 reflections and 95 parameters. 10 refs.

47888 (CEA-CONF—8818) Influence of ion implantation and gas exposure on the charge in SiO2 created by electronic excitation. Vigouroux, J.P.; Jollet, F.; Durand, J.P.; Le Gressus, C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Physico-Chimie). May 1986. 19p. (CONF-8605271—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752565.

From Congress on scanning electron microscopy; New Orleans, LA, USA (5 May 1986).

Low energy electron bombardment of amorphous SiO2 induces point defects such as oxygen vacancy by electronic excitation. The defects build a macroscopic negative charge by trapping of electrons on the localized levels in the band gap; this phenomenon was previously described as the "mirror" effect. In the present paper, we investigate by mirror effect the behavior of the charge after an argon, nitrogen and oxygen implantation at 1 and 4 keV, and after exposure to the same gases at various low pressures. We observe a difference of behavior between Ar (or N2) and O2. The results reinforce the outstanding role of oxygen in the defect production in SiO2 by electronic excitation.

47889 (CEA-CONF—8819) Behavior of fluoride glass optical fibers under gamma irradiation. Abgrall, A.; Boisde, G.; Poulain, M.; Maze, G.; Cardin, V. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. de Genie Radioactif). May 1986. 16p. (In French). (CONF-8605110—6). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752566.

From OPTO '86 conference; Paris, France (13 May 1986).

The effect of γ radiations (cobalt 60) on the behavior of fluoride glass preforms and optical fibers was investigated in the range 0.2 to 3.0 microns. Optical losses decrease from the ultraviolet to infra-red region. Relaxation of irradiated fluoride glasses was observed, at room temperature, during heat treatment, and performed as function of time and temperature. An optical fiber made from an irradiated preform did not show any observable defects. The online irradiation of optical fibers allowed to measure the optical losses at 2.4 and 2.8 microns, likewise the influence of dose rate and relaxation. A characterization of defects induced by γ radiation on preforms had been realized by Electron Spin Resonance methods. A synthesis of results of different authors is presented. Possible mechanisms of degradation of fluoride glasses under γ exposure are discussed, and in particular the influence of oxygen impurities in the lattice.

47890 **(DOE/ER/13666—1) Chemically modified electrodes and related solution chemistry: Technical progress report for the period 1/15/87 to 9/10/87.** Elliott, C.M. (Colorado State Univ., Fort Collins (USA). Dept. of Chemistry). 1987. Contract FG02-87ER13666. 12p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013721.

Three areas have been actively investigated: (1) We have continued our work with new electronically conducting polymer film modified electrodes and have begun to develop new monomers with differing properties. (2) We have synthesized a soluble polymer containing a dinuclear molybdenum complex that can be coated onto electrode surfaces. This material catalyzes the multielectron reduction of molecules such as azobenzene. (3) We have developed an electrochemically polymerizable porphyrin complex which, when polymerized onto an electrode, catalyzes the oxidation of olefins such as cyclohexene. 4 refs.

47891 **(DOE/ER/45107—5) Migration and transfer of triplet energy in selected polymer systems.** Burkhart, R.D.; Burrows, J.A.J. (Nevada Univ., Reno (USA). Dept. of Chemistry). 1987. Contract FG08-84ER45107. 10p. (CONF-8708118—1). NTIS, PC A02. File Number DE87014432.

From 13. international conference on photochemistry; Budapest, Hungary (9 Aug 1987).

Triplet energy transfer has been investigated in specially synthesized polymers consisting of a polystyrene main chain but with an aromatic carbonyl group located at one end of the chain and an naphthalene group at the other. Excitation at 337 nm selectively excites the aromatic carbonyl chromophore, and the spectroscopic evidence suggests that a part of this excitation energy becomes localized in the phenyl groups of the polymer chain. The mechanism for this process probably involves a spin forbidden singlet to triplet energy transfer which becomes partially allowed due to the strong spin-orbit coupling which exists at the aromatic carbonyl chromophore. Kinetic measurements of the luminescence decay of the phenyl group phosphorescence were made for polymers synthesized with and without the terminating naphthalene group. Decay rates were nearly three times as fast for those polymers containing the naphthalene group suggesting that some communication exists between chain ends. All luminescence measurements were made at 77°K in 2-methyltetrahydrofuran. 6 refs.

47892 **(DOE/ER/45107—6) The influence of polymer structure on triplet luminescence.** Burkhart, R.D.; Burrows, J.A.J. (Nevada Univ., Reno (USA). Dept. of Chemistry). 1987. Contract FG08-84ER45107. 2p. (CONF-870802—12). NTIS, PC A02. File Number DE87014431.

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

Triplet luminescence spectroscopy has been used to probe interactions between pendant groups of polymer chains. A styrene polymer was synthesized with naphthyl and phenylcarbonyl chromophores at the terminal positions. Information about inter- and intramolecular energy transfer was obtained from phosphorescence spectra in MTHF solutions at 77°K. (DLC)

47893 **(DOE/ER/45217—3) Mechanism of mechanical fatigue of fused silica: Progress report, July 1, 1985-August 31, 1987.** Tomozawa, M. (Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Materials Engineering). Sep 1987. Contract FG02-85ER45217. 7p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014199.

Various experiments were conducted to find out the correct mechanism for the mechanical fatigue of silica glass. First, it was shown that a crack tip in silica glass can be made blunt by appropriate thermal and chemical treatments. Furthermore, it was shown that the fatigue behavior of the treated glass with blunt cracks involves crack initiation, in addition to crack growth, while that of the freshly abraded glass with sharp cracks can be explained by slow crack growth only. Crack initiation under a subcritical stress was possible only in the presence of water and ammonia, while crack propagation can take place in the presence of other chemicals such as formamide and hydrazine also. Water and possibly ammonia enter the glass under stress and the entry of these chemicals appears to be responsible for crack initiation.

47894 **(DOE/ER/45224—T1) Theory of defects in nonmetallic solids: Progress report, 1 August 1986 to 31 July 1987.** Kunz, A.B. (Michigan Technological Univ., Houghton (USA). Dept. of Physics). Jul 1987. Contract FG02-85ER45224. 37p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014068.

A general method based upon ab initio quantum mechanical modelling and also using the semi-classical models based upon the concepts introduced by Mott and Littleton in 1938 are being implemented to provide a general theoretical approach to the study of point defects and impurities in non-metals. This model treats the impurity electronic structure and the lattice response to the impurity in a self-consistent way. Thus charge states of defects and impurities are readily studied as is the energy stability of the several states of charge. This project has resulted in a general, Fortran computer code called ICECAP. A functioning code has been generated to implement these ideas. Basic concepts have now been well validated in actual calculations. Studies have been performed on several alkali-halides and MgO. The first complete defect study, for Cu Impurity in NaF, is also complete. This study demonstrates the need for incorporation of lattice response to a defect if accurate energies are to result, as well as a need to improve efficiency of a few parts of the ICECAP automated process as well. Finally, initial studies on the V/sub k/ center in LiF are underway as are studies of the self-trapped excision in this system. 24 refs., 1 tab.

47895 (DOE/ER/60420—1, pp 335-346) **Behavior of carriers in quantum wells in GaAs-A ell/sub x/Ga/sub 1-x/As superlattices under in-plane magnetic fields.** Leite, J.R.; Oliveira, G.M.G.; Gomes, V.M.S.; Chaves, A.S. (Universidade de Sao Paulo, Brazil). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The effect of in-plane magnetic fields B up to 20 T on the carriers confined in symmetric (SQW) and asymmetric (AQW) quantum wells in n-type GaAs-A ell/sub x/Ga/sub 1-x/As superlattices is investigated by a self-consistent numerical solution of the Poisson plus Schroedinger equations. Quantum-well widths L/sub w/ = 75 A, 150 A, 225 A, and 300 A and 2D electron densities N/sub s/ = 0, 2.5, 5.0, and 7.5 (10^{11} cm^{-2}) are considered. The diamagnetic shift in the electron-hole recombination energy is shown to increase with increasing L/sub w/ and decreasing N/sub s/. For L/sub w/ $\geq$ 225 A and N/sub s/ $\geq$ 2.5 x 10^{11} cm^{-2} the energy dispersion $epsilon_1(k)$ of the first conduction subband in the SQW presents, at high fields, a double-minimum character so that the gap becomes indirect. For the AQW the symmetry $epsilon_1(k) = epsilon_1(-k)$ is broken, and the gap is also indirect. Recent photoluminescence measurements are discussed in relation to the present calculations.

47896 (DOE/ER/60420—1, pp 347-351) **Noble gas atoms as impurities in silicon.** Chacham, H.; Alves, J.L.A.; De Siqueria, M.L.; Leite, J.R. (Instituto de Ciencias Exatas, Belo Horizonte, Brazil). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Ground state one-electron energies have been calculated for the substitutional and interstitial helium, neon, and argon impurities in silicon by use of the self-consistent-field multiple-scattering X/sub a/ method within the framework of the Watson-sphere-terminated molecular cluster model. The substitutional noble gas atoms are found to inhibit the rebonding of the first neighbor's dangling bonds through orthogonality repulsion. The interstitial nobel gas atoms induce empty shallow levels close to the bottom of the conduction band. They tentatively relate these levels to the emission bands observed for silicon crystals implanted with helium, neon, and argon.

47897 **(EGG-M—32286) Diffraction moire: The dynamic regime.** Deason, V.A.; Epstein, J.S.; Reuter, W.G. (EG and G Idaho, Inc., Idaho Falls (USA)). 1987. Contract AC07-76ID01570. 14p. (CONF-870132—17). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014883.

From OE/LASE '87; Los Angeles, CA, USA (11 Jan 1987).

The technique of diffraction moire interferometry has been applied to numerous static and slowly changing stress configurations. The method has now been extended to the study of dynamic loading events, especially to the interaction of dynamic stress waves with such flaws as cracks or with the variations in composition found in composite materials. A pulsed ruby laser was used to provide the rapid (20 ns wide), brilliant and coherent illumination required for these studies. The technique and several specific applications are described.

47898 **(INIS-mf—10672) Neutron diffraction of the field induced magnetism in CsFeCl/sub 3/: Statics and dynamics of an incommensurate magnetic structure.** Knop, W. (Technische Univ. Berlin (Germany, F.R.). Fachbereich Physik). 10 Oct 1985. 153p. (In German). NTIS (US Sales Only), PC A08/MF A01. File Number DE87752779.

In the present thesis for the quasi-1-dimensional ferromagnetic S=1 singlet-ground-state system CsFeCl/sub 3/ neutron diffraction is performed in the temperature range $0.5 \leqq T \leqq 1.5$ K, and in an outer magnetic field $H \leqq 50$ kG in order to investigate the static and dynamic magnetic properties. By an outer magnetic field a magnetic moment is induced. For growing fields a magnetic Bragg reflection arises in an incommensurate position. These elastic measurements are confirmed by inelastic zero-field measurements. Moreover the inelastic results are described on the basis of the exciton model using the random-phase-approximation decoupling for a large field and temperature range. (BHO).

47899 **(LA-UR—87-2636) Effects of impurities on domain growth.** Srolovitz, D.J.; Grest, G.S.; Hassold, G.N.; Eykholt, R. (Los Alamos National Lab., NM (USA); Michigan Univ., Ann Arbor (USA). Dept. of Materials Science and Engineering; Exxon Research and Engineering Co., Annandale, NJ (USA); Colorado State Univ., Fort Collins (USA). Dept. of Physics). May 1987. Contract W-7405-ENG-36. 9p. (CONF-8705168—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014736.

From Workshop on competing interactions and microstructures: statics and dynamics; Los Alamos, NM, USA (5 May 1987).

In the present report, the effects of both static and diffusing impurities on domain growth kinetics are considered. In particular, the Monte Carlo simulations for nonconservative (Glauber) dynamics are employed to examine the effects of quenched impurities on domain growth in the Potts model with varying degeneracy Q ($2 \leqq Q \leqq 48$). The effects of diffusing impurities are examined within the framework of the Ising model (i.e., Potts model with $Q = 2$) as a function of impurity diffusivity. Finally, a theoretical analysis of the diffusing-impurity results is presented.

47900 **(LA-UR—87-2679) Thin film microstructures: Simulation and theory.** Mazor, A.; Srolovitz, D.J.; Hagan, P.S.; Bukiet, B.G. (Los Alamos National Lab., NM (USA)). Aug 1987. Contract W-7405-ENG-36. 8p. (CONF-8708110—8). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014732.

From 31. SPIE annual international technical symposium on optical and optoelectronic applied science and engineering; San Diego, CA, USA (16 Aug 1987).

The nature of the microstructure of physical vapor-deposited films depends sensitively on the substrate temperature during deposition. At low temperatures the microstructure is porous and ballistic aggregation-like, at intermediate temperatures the microstructure is columnar, and at elevated temperatures the grains are three dimensional. These different microstructural regimes are known as Zone I, II, and III, respectively. A theoretical analysis is presented in which the temporal evolution of the columnar microstructure (Zone II) is studied. The columnar microstructure is shown to be a balance between shadowing (which results in Zone I microstructures) and surface diffusion (which tends to smooth the surface). In addition to predicting the proper microstructure, this analysis properly predicts the temperature at which the Zone II to Zone I microstructural transition occurs. Since bulk diffusion is negligible and surface diffusion controls the microstructure in Zone II, the microstructure in the bulk of the film, may be viewed as frozen and all microstructural evolution occurs at the current, or active, surface. A Monte Carlo computer simulation technique which models the microstructural evolution of the surface is presented. The simulation follows the temporal evolution of realistic three dimensional Zone II microstructures and accounts for growth competition between adjacent grains and the formation of film texture.

47901 **(LA-UR—87-2873) Modeling of irradiation-induced amorphization in a titanate ceramic.** Coghlan, W.A.; Clinard, F.W. Jr. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 23p. (CONF-8708104—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014751.

From Conference on solid state amorphizing transformation; Los Alamos, NM, USA (10 Aug 1987).

Calculations have been carried out to model the alpha decay-induced conversion of a titanate ceramic ($CaPuTi_2O_7$) from the crystalline state to an amorphous condition. Experimental results have shown that the disordered state varies with irradiation temperature and extent of redamage, and so special consideration is given to those factors. Results of these calculations are applied to the analysis of dimensional changes during irradiation at various temperatures and release of stored energy on recovery to the crystalline state. Modeling results appear to show that it is possible to convert to the amorphous state under irradiation by two different processes. Modeling is also employed to extend experimental results on swelling from the present data base to a high damage rate characteristic of ion implantation and the low rates typical of nuclear waste storage and self-damage of natural mineral analogues. 15 refs., 5 figs.; 1 tab.

47902 **(LBL—23493) Fermi surface modifications and magnetic breakdown connected to charge-density waves in $NbSe_3$.** Coleman, R.V.; Everson, M.P.; Falicov, L.M.; Lu, Hao-An; Johnson, A. (Lawrence Berkeley Lab., CA (USA); Virginia Univ., Charlottesville (USA). Dept. of Physics). Jul 1987. Contract AC03-76SF00098. 3p. (CONF-870873—13). NTIS, PC A02. File Number DE87014678.

From 18. conference on low temperature physics; Kyoto, Japan (20 Aug 1987).

The magnetoquantum oscillations in $NbSe_3$ show frequency shifts and beat structures due to interaction with the pinned charge-density-wave (CDW) configuration. Measurements in magnetic fields up to 220 kG indicate that local deformations of the pinned CDW cause extremal area changes in small lens-shaped sections of normal Fermi surface (FS). Calculations of magnetic breakdown (MB) to the open nested sections of FS with a distribution of areas at the MB junctions can explain the data.

47903 **(LBL—23739) Determination of UTW K/sub XSi/ factors for low atomic number microanalysis: A systematic approach.** Krishnan, K.M.; Echer, C.J. (Lawrence Berkeley Lab., CA (USA)). Jul 1987. Contract AC03-76SF00098. 15p. (CONF-870733—12). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014118.

From Pacific workshop and meeting on analytical electron microscopy; Kona, HI, USA (12 Jul 1987).

A systematic measurement of experimental K/sub XSi/ factors, with particular emphasis on low Z microanalysis ($6 \leqq 7 \leqq 32$), at 200 kV for a KEVEX UTW Si(Li) detector fitted to a JEOL 200CX analytical microscope, using a variety of high purity standards has been carried out. Under normal operating conditions of a LaB_6 filament, it is shown that absorption in the specimen is very critical, particularly for heavy element matrices, and sample thicknesses need to be measured for accurate microanalysis of low Z elements (C,N,O). Using these measured K/sub XSi/ factors, quantitative UTW-EDX microanalysis has been routinely extended to carbon. 21 refs.

47904 **(LYCEN—8543) Rutherford backscattering analysis of GaAs/oxide interface.** Person, P.; Chevarier, A.; Chevarier, N.; Clechet, P.; Lamouche, D.; Martin, J.R.; Stern, M. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). Jul 1985. 16p. (CONF-850716—9). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752570.

From 7. international conference on ion beam analysis; Berlin, F.R. Germany (7 Jul 1985).

We have studied the behaviour of a gallium arsenide/anodic oxide heterostructure annealed under nitrogen with increasing temperatures. The As to Ga ratio evolution is measured using the technique of heavy ion Rutherford backscattering. These results are compared to photoluminescence measurements, which show that an annealing temperature of 550 deg C leads to the highest As surstoichiometry. Furthermore, we have investigated oxides created at higher temperatures.

47905 **(LYCEN—8553) Early stages in the formation of the oxide - InP (110) interface.** Hollinger, G.; Hughes, G.; Himpsel, F.J.; Jordan, J.L.; Morar, J.F.; Houzay, F. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). 1985. 14p. (CONF-8506360—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752569.

From International conference on the formation of semiconductor interfaces; Marseille, France (10 Jun 1985).

The early stages in the formation of the InP (110) - oxide interface have been studied using high energy resolution photoemission with synchrotron radiation. Both unexcited and excited oxygen were used. Changes were observed in P 2p, In 4d and valence band spectra. The oxidation of InP appears spatially inhomogeneous. Three stages were observed: a precursor chemisorption stage, a nucleation process, the formation of an oxide layer.

47906 **(LYCEN—8554) Si(111) surface oxidation: O ls core level study using synchrotron radiation.** Hollinger, G.; Morar, J.F.; Himpsel, F.J.; Hughes, G.L.; Jordan, J.L. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). 1985. 11p. (CONF-8506360—2). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752572.

From International conference on the formation of semiconductor interfaces; Marseille, France (10 Jun 1985).

We report new synchrotron radiation results for adsorption of oxygen at room temperature on Si(111) - 7 x 7 surfaces in the 1 L - 10/sup 4/ L exposure range. Core level Si 2p spectra measured at 150 eV are confronted to O ls spectra measured at 590 eV with high surface sensitivity and high energy resolution. The main finding is the presence, within the whole adsorption range, of two O ls components separated by 1.5 eV with an intensity ratio of about 1: 4. The main component at lower binding energy is identified with bridging oxygen atoms whereas the component with smaller intensity is related to surface atomic non bridging oxygen atoms which are converted into bridging oxygen atoms upon heating. These results show that chemisorbed oxygen and oxide-like bridging oxygen coexist and that oxidation dominates at coverages as low as 0.2 monolayer.

47907 (MLM—3419, pp 16-18) **Geometric powder characterization.** Bonekowski, N.R. Feb 1987. NTIS, PC A03/MF A01. File Number DE87008396.

In Materials science and characterization: Technology update-87.

Ideally, for the analyst, a powder would be composed of smooth, monodispersed, spherical particles. In the real world, however, most powders are composed of particles that are nonspherical in shape and polydispersed in size. Such powders require processing procedures geared specifically to their chemistry, particle size, and morphology (shape) if they are to perform consistently in a product. Recently, Mound acquired a high-resolution imaging system to analyze the complex shapes of the various organic and inorganic powders that are developed, processed, and used in products. This imaging system is discussed.

47908 (MLM—3419, pp 22-24) **Applications of polymer characterization.** Whitaker, R.B. Feb 1987. NTIS, PC A03/MF A01. File Number DE87008396.

In Materials science and characterization: Technology update-87.

The characterization of two polymeric materials common at Mound exemplifies the authors capabilities in choosing and applying analytical techniques in the area of polymers. Two materials, DAP, a thermoset, and PEEK, a thermoplastic, are routinely characterized in relation to the end uses of these polymers. Various analytical techniques are used. Such characterization not only assures the suitability of the polymer for the projected application, but it also allows the development of quality assurance test methods, which are then used on all DAP or PEEK polymeric starting materials.

47909 **(N—87-24563) Stability of bromine, iodine monochloride, copper (II) chloride, and nickel (II) chloride intercalated pitch-based graphite fibers.** Gaier, J.R.; Slabe, M.E.; Shaffer, N. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Jul 1987. 18p. (NASA-TM—89904; E—3431; NAS—1.15:89904; CONF-870796—2). NTIS, PC A02/MF A01.

From 18. biennial carbon conference; Worcester, MA, USA (19 Jul 1987).

Four different grades of pitch-based graphite fibers (Amoco P-55, P-75, P-100. and P-120) were intercalated with each of four different intercalates: bromine (Br_2), iodine monochloride (ICl), copper (II) chloride ($CuCl_2$), and nickel (II) chloride ($NiCl_2$). The P-55 fibers did not react with Br_2 or $NiCl_2$, and the P-75 did not react with $NiCl_2$. The stability of the electrical resistance of the intercalated fibers was monitored over long periods of time in ambient, high humidity (100 percent at 60 C), vacuum (10 to the -6 torr), and high temperature (up to 400 C) conditions. Fibers with lower graphitization form graphite intercalation compounds (GIC's) which are more stable than those with higher graphitization (i.e., P-55 (most stable) greater than P-75 greater than P-100 greater than P-120 (least stable). Br_2 formed the most stable GIC's followed in order of decreasing stability by ICl, $CuCl_2$, and $NiCl_2$. While Br2 GIC's had the most stability, ICl had the advantages of forming GIC's with slightly greater reduction in resistance (by about 10%) than Br_2, and the ability to intercalate P-55 fiber. Transition metal chlorides are susceptible to water vapor and high temperature. The stability of fibers in composites differs.

47910 **(ORNL/M—406) BES [Basic Energy Sciences] welding science: Contractors summary report, 1986-1987.** David, S.A. (comp.). (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 38p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014358.

Individual projects are processed separately for the data bases. (CBS)

47911 **(SAND—87-1717C) Enhanced diffusion processes during heavy-ion irradiation of glasses.** Arnold, G.W.; Battaglin, G.; Della Mea, G.; De Marchi, G.; Mazzoldi, P.; Miotello, A. (Sandia National Labs., Albuquerque, NM (USA); Padua Univ. (Italy). Dipartimento di Fisica; Trento Univ. (Italy). Dipartimento dei Materiali; Consiglio Nazionale delle Ricerche, Trento (Italy)). 1987. Contract AC05-84OR21400. 12p. (CONF-870783—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013996.

From Radiation effects in insulators-4 conference; Lyon, France (6 Jul 1987).

Alkali silicate glasses have been irradiated by using Ar ions at energy of and above 200 keV. The target temperature was varied in the range between liquid nitrogen temperature and 200°C. The observed modifications in alkali depth distribution, determined by nuclear techniques, have been analyzed on the basis of phenomenological models. 12 refs., 3 figs.

47912 **(UCRL—53794) Optical characterization of silica aerogel glass.** Hrubesh, L.W. (Lawrence Livermore National Lab., CA (USA)). Jul 1987. Contract W-7405-ENG-48. 25p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014617.

This report compares several techniques that have been used to optically characterize porous silica aerogel glass. These techniques are accurate and rapid, and they provide excellent alterna-

tives to nonoptical methods for the nondestructive evaluation of silica aerogel material. 5 refs., 19 figs.

47913 **(UCRL—96527) Shock-induced cooling in dense fluids.** Radousky, H.B. (Lawrence Livermore National Lab., CA (USA)). Jul 1987. Contract W-7405-ENG-48. 7p. (CONF-870753—71). NTIS, PC A02. File Number DE87014343.

From 5. topical conference of the American Physical Society on shockwaves in condensed matter; Monterey, CA, USA (20 Jul 1987).

Radiative temperatures have been measured for fluid nitrogen which has been single shocked to pressures of 18 to 81 (180 to 810 kbar) and then double shocked against both Al_2O_3 and LiF windows. Shock temperatures are particularly interesting in materials such as nitrogen, which undergoes a continuous dissociative phase transition starting at 30 GPa and 7000° K. In nitrogen, the dissociative transition leads to a new effect, which is shock-induced cooling. Preliminary results indicate that xenon provides a second example of the effect in a dense fluid system. The phenomenon depends on the existence of an absorption mechanism or "energy sink" in the material which changes rapidly with density. For nitrogen this is molecular to non-molecular dissociation, while for xenon the mechanism is the excitation of electrons over a rapidly closing energy gap. 10 refs., 5 figs.

47914 **Photoreflectance of reduced poly 3-methyl thiophene.** Yuan, R.; Shen, S.C.; Tomkiewicz, M.; Ginley, D.S. (Department of Physics, Brooklyn College of CUNY, Brooklyn, New York 11210). *Journal of Applied Physics;* **62**: No. 9, 3932-3935(1 Nov 1987).

We present photoreflectance studies of poly 3-methyl thiophene as a function of doping level, temperature, and light intensity. The as-grown polymer does not show any photoreflectance signal. As the doping level is reduced by electrochemical reduction of the polymer, two peaks are observed in the spectra. One peak, at —2 eV, corresponds to the band-to-band transition. The second peak, at —1.7 eV, corresponds to the transition between the top of the valence band and the upper bipolaron level. These results are almost identical to those reported for the electrolyte electroreflectance of the polymer when it was in contact with an aqueous electrolyte. The major difference in the results using these two techniques is in the observation, in photoreflectance, of the bipolaron transition in the neutral, fully reduced polymer. This was interpreted in terms of bipolaron formation through photodoping. The similar spectral characteristics between the photodoped and electrodoped bipolaron are further support to the findings that the bipolarons are intrinsic excitations which are independent of the way in which they are generated.

47915 **Relaxation of strained-layer semiconductor structures via plastic flow.** Dodson, B.W.; Tsao, J.Y. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Applied Physics Letters;* **51**: No. 17, 1325-1327(26 Oct 1987). Contract AC04-76DP00789.

An outstanding puzzle concerning strained-layer semiconductors is that metastable structures can be grown in which exact coherence with the lattice is apparently conserved in layers much thicker than the equilibrium critical thickness. Using standard descriptions of dislocation dynamics and relaxation via plastic flow, a model for the relaxation of an initially coherent metastable strained layer is developed. This model is applied to relief of mismatch strain in the SiGe/Si(100) system, and good agreement with experimental data is found. Furthermore, the combined effect of relaxation kinetics and finite instrumental resolution on the observed critical thickness was calculated. The results successfully reproduce experimental data on metastable critical thickness in the SiGe/Si(100) system.

47916 **Optically tuned, all-semiconductor optical interference filter.** Gourley, P.L.; Biefeld, R.M.; Johnson, P.B. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Applied Physics Letters;* **51**: No. 17, 1310-1312(26 Oct 1987). Contract AC04-76DP00789.

Optical tuning of an epitaxial, all-semiconductor optical interference filter is reported. The filter is a high reflector composed of alternating, strained layers of GaP (360 A) and GaAs/sub 0.2/P/sub 0.8/ (360 A) grown by metalorganic chemical vapor deposition. With low optical power, these reflectors exhibit reflectances up to 90% at 510 nm over a 10-nm bandwidth. With absorbed optical pulses of energy density 3 mJ/cm^2, this high-reflectance zone can be blue shifted by 20 A. As a result, very large changes in reflectance can be produced. The effect is interpreted as a plasma-induced refractive index depression in a semiconductor superlattice. Furthermore, the layer strain enhances the optically induced index change of the high reflector compared to that in bulk materials.

47917 **Electron-diffraction study of rubidium-intercalated graphite.** Mittleman, R.K. (The Enrico Fermi Institute, The University of Chicago, 5640 South Ellis Avenue, Chicago, Illinois 60637). *Physical Review [Section] B: Condensed Matter;* **36**: No. 11, 6001-6011(15 Oct 1987).

Using an analytical scanning transmission electron microscope we monitored the in-plane structure of rubidium-intercalated graphite as it underwent the deintercalation process. Starting with a saturated, stage-1 sample and using a temperature-controlled sample stage to control the desorption process, we allowed the graphite to deintercalate over a period of many days. This created a series of unannealed structures of progressively higher stage number. The experiment encompassed a regime in which the dominant factor in determining the intercalant in-plane distribution changed from host-intercalant to intercalant-intercalant interactions. High-resolution electron diffraction techniques were used to follow the in-plane superlattice structure of the intercalant. Ordered commensurate superlattices were observed which were stable over the entire temperature range observed (79—300 K) . In addition, an amorphous phase was observed which underwent a phase transition to an incommensurate square array. Both commensurate and incommensurate transition structures were observed during the transition period. The incommensurate structure was not affected by temperature and does not match the general lattice parameters for incommen- surate lattices which have been previously reported in the alkali-metal-intercalated graphite compounds.

47918 **Analysis of the off-center effect of Cu^+ in alkali halides using crystal-field theory.** Payne, S.A. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physical Review [Section] B: Condensed Matter;* **36**: No. 11, 6125-6131(15 Oct 1987). Contract W-7405-ENG-48.

We have found that the relative intensity of the ^{1}A/sub 1g/ $\rightarrow$ ^{1}E/sub g/ and ^{1}A/sub 1g/ $\rightarrow$ ^{1}T/sub 2g/ crystal-field components of the 3d/sup 10/ $\rightarrow$ 3d^{9}4s transition of Cu^+ in alkali halide hosts provides a measure of the Cu^+ ground-state off-center displacement along the [111] axis. This is shown by deriving the crystal- field potential that describes the off-center effect of Cu^+, and then calculating the transition moments to the ^{1}E/sub g/ and ^{1}T/sub 2g/ final states. By analyzing the spectra of Cu^+ in numerous alkali halide hosts, it is found that the degree of off-center displacement increases with the lattice constant of the alkali halide.

47919 **Interference-enhanced Raman scattering from TiO_2/SiO_2 multilayers: measurement and theory.** Craig, R.A.; Exarhos, G.J.; Pawlewicz, W.T.; Williford, R.E. (Pacific Northwest Laboratory, Richland, Washington 99352). *Applied Optics;* **26**: No. 19, 4193-4197(1 Oct 1987).

Raman-band intensities for sputter-deposited TiO_2/SiO_2 multilayer coatings are found to exhibit a strong dependence on excitation wavelength of the probe laser. A model based on standing waves within the stack correctly predicts the magnitude and wavelength dependence of the observed enhancements.

47920 **Observation of the highest ground-state magnetic moment of Ce in CeSi: Possibility of a quartet ground state.** Shaheen, S.A. (Serin Physics Laboratory, Rutgers University, Piscataway, New Jersey 08855-0849). *Physical Review [Section] B: Condensed Matter;* **36**: No. 10, 5472-5475(1 Oct 1987).

The magnetic properties of CeSi which crystallizes in the FeB-type orthorhombic structure have been investigated. Experimental results indicate that CeSi is an antiferromagnet (T/sub N/

= 5.6 K) with interesting ground-state properties. Its ground-state magnetic moment attains a value of 1.47μ/sub B/ in a field of 57 kOe at 3.0 K, which is far above the highest value ever observed for any Ce compound. The ground state surprisingly appears to be a quartet in spite of a noncubic crystal symmetry of this compound. Unlike other nearly trivalent Ce intermetallic compounds, no evidence for the Kondo effect is apparent in this compound.

47921 **Superhyperfine structure of the H/sup 2-/ ion in MgO.** Orera, V.M.; Chen, Y. (Instituto de Ciencias de Materiales de Aragon, Universidad de Zaragoza-Consejo Superiorde Investigaciones Cientificas, Zaragoza, 50009, Spain). *Physical Review [Section] B: Condensed Matter;* **36**: No. 10, 5576-5577(1 Oct 1987).

The electron-paramagnetic-resonance structure observed in the H/sup 2-/ signal in thermochemically reduced MgO crystals has been analyzed and is shown to be due to the interaction with the /sup 25/Mg isotopes of the MgO lattice. It supports a defect configuration comprising of a proton with three electrons in the anion sublattice. The values of the interaction parameters are compatible with the previous ground-state calculations.

47922 **Evolution of heavy-fermion behavior from mixed-valence state in the series Ce(Pt/sub 1-//sub x/Ni/sub x/)Si.** Lee, W.H.; Ku, H.C.; Shelton, R.N. (Ames Laboratory and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review [Section] B: Condensed Matter;* **36**: No. 10, 5739-5742(1 Oct 1987).

We present the room-temperature lattice parameters, the static magnetic susceptibility, and the magnetic resistivity between 2.4 and 300 K for a series of 10 polycrystalline Ce(Pt/sub 1-//sub x/Ni/sub x/)Si samples with x = 0.0 to 1.0. An abrupt change in the lattice constant as well as in T/sub max/(chi/sub m/) and T/sub max/(rho/sub m/) occurs around x = 0.5. This is evidence for the transition from heavy-fermion behavior to a mixed-valence state. The magnetic susceptibility and magnetic resistivity data support the interpretation of resistivity maximum in terms of a spin-scattering mechanism in the mixed-valence regime, while the Kondo scattering mechanism is expected to be valid at high temperature (T>T/sub SF/) in the Kondo-lattice regime. From the present study, the heavy-fermion material is believed to be a Kondo-lattice compound with a relatively strong Ruckerman-Kittel-Kasuya-Yotida interaction.

47923 **Pressure-induced disproportionation of cesium iodide.** Quentin Williams; Jeanloz, R. (Department of Geology and Geophysics, University of California, Berkeley, California 94720). *Physical Review Letters;* **59**: No. 10, 1132-1135(7 Sep 1987).

X-ray diffraction and electrical conductivity measurements demonstrate that CsI undergoes pressure-induced, high-temperature decomposition to its constituent elements at pressures exceeding 45 GPa. Our results provide a natural explanation for the apparent discrepancy between previous shock-wave and static compression measurements performed on CsI. Also, our observations imply that the metallic phase of CsI is metastable and that changes in the electronic properties of the heavy alkali metals at high pressures strongly decrease the tendency of these elements to form ionic compounds.

47924 **Molecular-dynamics simulation of low-energy beam deposition of silicon.** Dodson, B.W. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Journal of Vacuum Science and Technology, B: Microelectronics Processing and Phenomena;* **5**: No. 5, 1393-1398(Sep 1987). Contract AC04-76DP00789.

The mechanisms controlling low-energy (10—100 eV) beam deposition of silicon onto a relaxed (111) silicon substrate have been studied using a molecular dynamics technique. The atomic interaction was modeled using a many-body empirical potential so that the effects of the covalent Si—Si bonding could be accurately included. Silicon atoms (10 eV) with near-perpendicular incidence were studied to determine the energy-loss mechanism resulting in capture and the local lattice excitation near and subsequent diffusion of excess vibrational energy away from the impact point. Shallow angles of incidence (5°—30°) were studied for beam energies of 20—100 eV. For incidence angles less than an energy- and orientation-dependent critical value, a new phenomenon of "surface channeling" is observed, in which the trajectory of the incoming particle is steered parallel to, and roughly 2 A above, the surface of the substrate by inelastic interaction with the surface atoms. The phenomena observed in low energy beam deposition offer considerable promise for precision control of the growth of nonequilibrium semiconductor structures.

47925 **Determination of band offsets in AlGaAs/GaAs and InGaAs/GaAs multiple quantum wells.** Ji, G.; Huang, D.; Reddy, U.K.; Unlu, H.; Henderson, T.S.; Morkoc, H. (Coordinated Science Laboratory, University of Illinois at Urbana, Urbana, Illinois 61801). *Journal of Vacuum Science and Technology, B: Microelectronics Processing and Phenomena;* **5**: No. 5, 1346-1352(Sep 1987).

The determination of valence band offsets Q/sub v/ by fitting the optical transmission spectra for Al/sub x/Ga/sub 1-//sub x/As/GaAs and In/sub y/Ga/sub 1-//sub y/As/GaAs multiple quantum wells (MQWs) is discussed. The valence band offset Q/sub v/ is defined as Q/sub v/ = ΔE/sub v//(ΔE/sub v/+ΔE/sub c/), where ΔE/sub v/ and ΔE/sub c/ are the valence and conduction band discontinuities at the heterojunction. For Al/sub x/Ga/sub 1-//sub x/As/GaAs (Type I for both heavy holes and light holes, i.e., electrons, heavy holes, and light holes are located in the same layers) the energy separation ΔE between the first light and heavy hole subbands in the valence band is used to determine the valence-band offset Q/sub v/. In order to improve the precision, MQWs with narrow well widths and higher Al mole fraction x should be used. Further, the inclusion of coupling between the valence and conduction subbands in Kane's three-band model is also essential. However, Q/sub v/ is still not determined uniquely by the above energy difference ΔE. Different combinations of Q/sub v/ and heavy hole effective masses m/sub h//sub h/ in GaAs can lead to the same ΔE. The forbidden transition E/sub 13//sub h/ in a narrow well can be used to identify the actual values of m/sub h//sub h/ and Q/sub v/.

47926 **Sum-frequency generation on dye-coated surfaces using collinear and noncollinear excitation geometries.** Muenchausen, R.E.; Nguyen, D.C.; Keller, R.A.; Nogar, N.S. (Chemical and Laser Sciences Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Vacuum Science and Technology, B: Microelectronics Processing and Phenomena;* **5**: No. 5, 1466-1469(Sep 1987).

Resonantly enhanced surface second-harmonic generation and sum-frequency generation has been demonstrated on rhodamine 6G coated glass substrates using different excitation geometries. The collinearly excited, doubly-resonant sum-frequency signal is enhanced by more than two orders of magnitude relative to resonantly enhanced second-harmonic generation. For noncollinear excitation, the relative efficiency of nonlinear generation as a function of the angular dependence of the input beams is calculated and compared with experiment.

47927 **Role of Farben centers in electron- and photon-stimulated desorption from alkali halides.** Loubriel, G.M.; Green, T.A.; Tok, N.H.; Haglund R.F. Jr. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Journal of Vacuum Science and Technology, B: Microelectronics Processing and Phenomena;* **5**: No. 5, 1514-1518(Sep 1987). Contract AC04-76DP00789.

Measurements of the time history of ground-state neutral lithium desorption from LiF during pulsed electron irradiation have resulted in a new model for the lithium-desorption mechanism. We show that the slow diffusion to the surface of bulk Farben (F) centers created by the electron-beam is the rate-controlling factor responsible for most of the time history of the lithium desorption rather than the thermal evaporation of the metal from the surface. Comparison between theoretical and experimental time dependencies yields values for the F center diffusion constant and its activation energy.

47928 **Shrinkage and opacity of 100 kg/m/sup 3/ silica aerogel foam in liquid deuterium-tritium.** Fearon, E.M.; Coronado, P.R.; Garza, R.G.; Darling, D.H.; Souers, P.C. (Lawrence Livermore National Lab., CA, USA). *Journal of Nuclear Materials;* **149**: No. 1, 105-108(Jun 1987). Contract W-7405-ENG-48.

Letter-to-the-editor.

47929 **Method to produce titanium aluminide metal-matrix composite articles.** Froes, F.H. (to Dept. of the Air Force, Washington, DC). US Patent Application 7-013,817. 12 Feb 1987. 12p. NTIS, PC A02/MF A01.

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to a method for fabricating filament reinforced composite articles. In particular, this invention is directed to a method for fabricating filament-reinforced titanium aluminide matrix composite materials. Composite metallic structures, which are reinforced with high-strength, high-modulus filaments or fibers having high specific properties. With particular respect to the aerospace industry, titanium-based composites have been considered for high-temperature applications because of the high-temperature strength and low density of titanium and its alloys. Fiber-reinforced titanium-based composites exhibit increased temperature capability, improved shear, transverse, and off-axis properties; and better erosive environment durability when compared with presently available aluminum-matrix and polymeric matrix composite systems.

47930 **Radiation damage to dielectric mirrors.** Harrison, F.B. (Los Alamos National Lab., Los Alamos, NM). pp 37-39 of Topical meeting on optics in adverse environments (Summaries). Washington, DC; Optical Society of America (1987). (CONF-870220—).

From Southwest optics conference; Albuquerque, NM, USA (9 Feb 1987).

This study measures the change in reflectivity of multilayer dielectric (Alumina-Cryolite) high-reflectivity mirrors under simultaneous irradiation by a KrF laer (248-nm) and electrons from a (2 MeV) Febetron 705 accelerator. Measurements were made at a number of different laser pulse energies and electron intensities. In no case but the last (highest intensity) was there any indication of a reduction in reflectivity due to the radiation pulse. The Questek Series 2000 excimer laser puts out a pulse about 20 nsec long, with a shape indicating longitudinal mode beating. The beam is rectangular. Vertical scans at different horizontal positions give a smooth, approximately Gaussian profile, but the horizontal scan shows an irregular shape which is not improved by spatial filtering. The quoted beam intensities correspond to the highest peak.

47931 **Development of alumina - and mullite - SiC whisker composites: High temperature properties.** Tiegs, T.N.; Becher, P.F. (Oak Ridge National Lab., Oak Ridge, TN). pp 279-284 of Proceedings of the 24th automotive technology development contractors coordination meeting (P-197). Warrendale, PA; Society of Automotive Engineers (1986). (CONF-861002—). Contract AC05-84OR21400.

From Automotive technology development contractors' coordination meeting; Dearborn, MI, USA (27 Oct 1986).

The development of SiC whisker-reinforced ceramic composites is proceeding. At the present time, substantial fracture toughness and strength improvements for alumina and mullite matrix composites have been demonstrated. Equally important is that these properties are retained to temperatures of at least 1000°C. In addition, the alumina-SiC whisker composites have been shown to have excellent resistance to static fatigue at temperatures up to 1100°C. Degradation of the mechanical properties by oxidation is a potential problem for high-temperature structural applications. However, with the use of high purity matrices degradation can be minimized. The present paper presents recent results on the high-temperature and long-term properties of alumina- and mullite-SiC whisker reinforced ceramic composites in air. Other recent results from ORNL on sintering, influence of interface properties, and the rheology of aqueous mixtures of alumina-SiC whisker composites have been published elsewhere.

40 CHEMISTRY

47932 **(ANL—87-19) Chemical Technology Division annual technical report, 1986.** (Argonne National Lab., IL (USA)). Jun 1987. Contract W-31109-ENG-38. 225p. NTIS, PC A10/MF A01; 1; GPO Dep. File Number DE88000233.

Highlights of the Chemical Technology (CMT) Division's activities during 1986 are presented. In this period, CMT conducted research and development in areas that include the following: (1) high-performance batteries - mainly lithium-alloy/metal sulfide and sodium/sulfur; (2) aqueous batteries (lead-acid, nickel/iron, etc.); (3) advanced fuel cells with molten carbonate or solid oxide electrolytes; (4) coal utilization, including the heat and seed recovery technology for coal-fired magnetohydrodynamics plants, the technology for fluidized-bed combustion, and a novel concept for CO_2 recovery from fossil fuel combustion; (5) methods for recovery of energy from municipal waste; (6) methods for the electromagnetic continuous casting of steel sheet; (7) techniques for treatment of hazardous waste such as reactive metals and trichloroethylenes; (8) nuclear technology related to waste management, a process for separating and recovering transuranic elements from nuclear waste, and the recovery processes for discharged fuel and the uranium blanket in a sodium-cooled fast reactor; and (9) physical chemistry of selected materials in environments simulating those of fission and fusion energy systems. The Division also has a program in basic chemistry research in the areas of catalytic hydrogenation and catalytic oxidation; materials chemistry for associated and ordered solutions at high temperatures; interfacial processes of importance to corrosion science, surface science, and catalysis; the thermochemistry of zeolites and related silicates; and the geochemical processes responsible for trace-element migration within the earth's crust. The Division continued to be the major user of the technical support provided by the Analytical Chemistry Laboratory at ANL. 127 refs., 71 figs., 8 tabs.

47933 **(ORNL—6343) Chemical Technology Division progress report for the period April 1, 1985 to December 31, 1986.** (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 231p. NTIS, PC A15/MF A01; 1; GPO Dep. File Number DE87014958.

This progress report summarizes the research and development efforts conducted in the Chemical Technology Division (Chem Tech) during the period April 1, 1985, through December 31, 1986. The following major areas are covered in the discussion: nuclear and chemical waste management, environmental control technology, basic science and technology, biotechnology research, transuranium-element processing, Nuclear Regulatory Commission programs, radioactive materials production, computer/engineering applications, fission energy, environmental cleanup projects, and various other work activities. As an appendix, the Administrative Summary presents a comprehensive compilation of publications, oral presentations, awards and recognitions, and patents of Chem Tech staff members during this report period. An organization chart, a staffing level and financial summary, and lists of seminars and Chem Tech consultants for the period are also included to provide additional information. 78 figs., 40 tabs.

4001 Analytical And Separations Chemistry

REFER ALSO TO CITATION(S) 47031, 47190, 47243, 47811, 47853, 48017, 48018, 48039, 48040, 48041, 48237, 48278, 48341, 48391, 48432

47934 **(BDX—613-3813) High-performance liquid chromatography methods for characterization of a plating bath brightener additive: Final report.** Foster, R.L. (Allied Corp., Kansas City, MO (USA). Bendix Kansas City Div.). Sep 1987. Contract AC04-76DP00613. 32p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000138.

A high-performance liquid chromatography method of characterizing a brightener additive used in the acid copper sulfate plating bath has been developed. Three well-resolved sets of component peaks were developed using acetonitrile/water solvents on octadecylsilane or phenyl columns. The components were determined to be several molecular weight ranges of polyethylene glycols, an

alkylphenolpolyethoxylate surfactant, and minor common contaminants. This method and the chromatogram are provided for future reference. 9 refs., 15 figs.

47935 **(DOE/PC/90534—6) Supercritical fluid chromatography/supersonic jet spectroscopy: Progress report, 6/1/87-8/31/87.** Goates, S.R.; Lee, M.L. (Brigham Young Univ., Provo, UT (USA). Dept. of Chemistry). Sep 1987. Contract FG22-86PC90534. 9p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000297.

We have managed to solve our earlier problems with loss of sensitivity, and have begun to pursue chromatographic studies with supersonic jet detection using perylene as a test compound. Our first attempts were made with a 10 m-long, 50 μm diameter, C8-stationary phase column and a 2.5 μm pinhole restrictor. We have identified our previous problems with chromatographic resolution with the transfer capillary leading from the oven to the nozzle. In these experiments no transfer column was used, and the chromatographic column was run to the nozzle. Carbon dioxide was the mobile phase; the column temperature was maintained at 50°C, and the nozzle temperature, at 200°C. The pinhole was sealed to the column end as we have done in the past. Results of these first trials are somewhat difficult to interpret. First-of-all, it was clear that the linear velocity with this column and restrictor were too great for good chromatographic resolution. However, we were able to detect perylene at the nanogram level at 300 atm or greater pressures. Signal intensity dropped off with decreasing pressure, even though no appreciable band broadening was observed. The lack of significant tailing in the eluted band, at all pressures down to 150 atm, suggests that the flow is sufficiently directed out of the nozzle that dead volume is not a problem, but the possibility that the apparent sample loss is associated with the nozzle connection led us to revise our direct expansion nozzle somewhat. The pinhole disk is sealed from the back so that it is flush with the capillary column. Another area of possible interference is either a hot or a cold spot in the heated-nozzle interface. 4 refs.

47936 **(DP-MS—87-18) Colorometric determination of Fe(II)/Fe(III) ratio in glass.** Baumann, E.W.; Coleman, C.J.; Karraker, D.G.; Scott, W.H. (Savannah River Lab., Aiken, SC (USA)). 1987. Contract AC09-76SR00001. 13p. (CONF-870802—11). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87012921.

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

A colorimetric method has been developed to determine the Fe(II)/Fe(III) ratio in glass containing nuclear waste. Fe(II) is stabilized with pentavalent vanadium during dissolution in sulfuric and hydrofluoric acids. The chromogen is Ferrozine (Hach Chemical Company), which forms a magenta complex with Fe(II). The two-step color development consists of determining the Fe(II) by adding Ferrozine, followed by determining total Fe after the Fe(III) present is reduced with ascorbic acid. The method was validated by analyzing mixtures of ferrous/ferric solutions and nonferrous glass frit and by comparison with Moessbauer spectroscopy. The effect of gamma radiation was established. The procedure is generally applicable to nonradioactive materials such as minerals and other glasses. 5 refs.

47937 **(INIS-mf—10670) Proton induced X-ray emission (PIXE) for the quantitative analysis of elements in thin samples, in surface layers of thick samples, and in aerosol filters.** Waetjen, U. (Marburg Univ. (Germany, F.R.). Fachbereich 13 Physik). 19 May 1983. 268p. (In German). NTIS (US Sales Only), PC A12/MF A01. File Number DE87752621.

The PIXE analysis method for the determination of elements in thick samples was investigated. The text of the present thesis is arranged under the following headings: physical fundamentals and measuring equipment, quantitative analysis of thin samples, matrix effects at the PIXE analysis of thick samples, matrix correction methods, analysis of 'infinite thick' model substances, PIXE analysis of aerosol filters. (GSCH).

47938 **(INIS-mf—10676) Development and method of use of a mass spectrometric isotope dilution analysis within the use of negative thermoionisation for determination of boron traces.** Zeininger, H. (Regensburg Univ. (Germany, F.R.). Naturwissenschaftliche Fakultaet 4 - Chemie und Pharmazie). 1984. 198p. (In German). NTIS (US Sales Only), PC A09/MF A01. File Number DE87752790.

A mass spectrometric trace boron determination using negative thermionisation was developed. It is based on the determination of the ratio of BO/sub 2//sup -/ isotopes (/sup 10/B and /sup 11/B). A high stability and a constant intensity at a given temperature of the BO/sub 2//sup -/ ion currents allow for a computer controlled measurement with a programmed heating. The reproducibility lies at around 0,004-0,08%. The boron determination using Mels potentiometry with a BF/sub 4//sup -/-ion selective electrode was used as an analytical comparison method. The MS-IDA was first used on metal samples, such as Al, Zr, and steel. Later on the boron in reagents, biological material (milk powder, spinach, water plants) and water were determined. For this material-dependent hydrolysation and separation procedures were worked out. The MS-IDA in comparison to all other analytical methods used by other collaborators offers the greatest accuracy.

47939 **(LYCEN—8539) Heavy ion Rutherford backscattering analysis used to study alloyed metal/GaAs interface.** Chevarier, A.; Chevarier, N.; Stern, M.; Lamouche, D.; Clechet, P.; Martin, J.R. Person, P. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). 1985. 16p. (CONF-850813—5). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752571.

From 11. international conference on atomic collisions in solids; Washington, DC, USA (4 Aug 1985).

Heavy ion backscattering analysis of the near surface Pd/GaAs and Au:In/Pd/GaAs chemically prepared systems have been investigated as function of annealing temperature. We performed RBS analysis using 7 MeV incident energy nitrogen beam connected with a time of flight spectrometer detection. Using RBS random spectra, such method can resolve the compostion of the alloyed deposited films (less 5 nm) and can profile As and Ga over 40 nm. The two main results got from such analysis are: first, chemical palladium deposition is connected with a lack of arsenic which is preferentially exchanged to gallium atoms. Second, palladium diffusion is enhanced when using Au:In/Pd alloyed contacts.

47940 **(ORNL/TM—10327) A modeling study of vacuum sorption characteristics of carbon dioxide on 4A zeolite molecular sieves.** Prazniak, J.K.; Byers, C.H. (Oak Ridge National Lab., TN (USA); Tennessee Univ., Knoxville (USA)). Aug 1987. Contract AC05-84OR21400. 93p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000042.

A model is presented to describe the isothermal adsorption of carbon dioxide (CO_2) and of nitrogen (N_2) on 4A zeolite molecular sieves under cryogenic conditions. The model is comprised of a fluid-phase mass balance representing the dynamics of gas in the bed and a one-dimensional diffusion equation representing adsorption in the solid. Cubic crystals of 4A zeolite are assumed to be spherical, and the concentration dependence of the diffusivity of the sorbate in both the gas and solid phases is considered. Numerical solution of the parabolic partial differential model equations is accomplished using orthogonal collocation in conjunction with an ordinary differential equation integrator suitable for stiff equations. 34 refs., 18 figs., 5 tabs.

47941 **(ORNL/TM—10506) Detection of vapors of flammable liquids in air by atmospheric sampling mass spectrometry/mass spectrometry: Progress report, March 31, 1987.** McLuckey, S.A.; Glish, G.L.; Asano, K.G.; McBay, E.H. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 146p. NTIS, PC A07/MF A01; 1; GPO Dep. File Number DE88000030.

The detection of vapors of flammable liquids by atmospheric sampling glow discharge ionization coupled with mass spectrometry/mass spectrometry (MS/MS) is described. An atmospheric sampling ionization source based on a glow discharge has been developed for ionizing trace organic molecules in ambient air. This ion

source has been coupled with a tandem mass spectrometer consisting of a quadrupole mass filter and a time-of-flight analyzer. This ion source/spectrometer combination has been evaluated for detecting vapors of flammable liquids in the positive ion mode. The flammable liquids tested include inter alia alcohols, hydrocarbon solvents, and several hydrocarbon fuel mixtures. The hydrocarbon fuel mixtures were first characterized by gas chromatography/mass spectrometry using 70 eV electron impact ionization. Mass spectra using a glow discharge ionization source were acquired for all samples. MS/MS spectra were acquired for all of the major ions observed in the mass spectra. The mass spectra are described, as are some of the MS/MS spectra. Both mass spectra and MS/MS spectra are included in appendices. The approach has been found to provide both high sensitivity and high specificity for the detection of vapors of flammable liquids in ambient air. The limits of detection for most of the compounds studied is expected to be on the order of parts per billion or less. 33 figs., 3 tabs.

47942 **Channel and analyte dynamics in the high-voltage spark discharge using Raman, fluorescence, and emission spectroscopies.** Zoellner, M.J.; Scheeline, A. (School of Chemical Sciences, University of Illinois, 1209 W. California Ave., 79 RAL, Box 48, Urbana, Illinois 61801). *Applied Spectroscopy;* **41**: No. 6, 943-953(Aug 1987).

An investigation was made of the use of laser light scattering and laser-induced resonance fluorescence, employed in combination with spontaneous emission, as diagnostic probes of the atmospheric-pressure high-voltage spark discharge, to elucidate information on various species. Raman scattering allowed the space- and time-resolved investigation of N_2 behavior in the spark channel. Emission profiles of Al(I) and AlO were obtained to establish the temporal regions that were nonemitting for each species. Resonance fluorescence permitted observation of aluminum species in the nonemitting post-discharge torus both spatially and temporally resolved. The channel dynamics studies revealed the interaction of atmospheric nitrogen with the spark channel. Fluorescence studies on aluminum as the analyte species revealed the presence of Al(I) and AlO in the post-discharge torus region, after the discharge current has ceased, and after the Al(I) and AlO emission has ceased. This establishes that analyte material exists in more than one chemical form in the nonemitting regions of the spark discharge, and that excitation decays before all free atoms recombine into small molecules.

47943 **Unified analysis of noncomparative methods for measuring the molar absorptivity of triplet-triplet transitions.** Carmichael, I.; Hug, G.L. (Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana 46556). *Applied Spectroscopy;* **41**: No. 6, 1033-1038(Aug 1987).

Noncomparative techniques for the measurement of the molar absorptivity of triplet-triplet absorption transitions, ϵ/sub T/*, are reviewed. The methods covered include singlet depletion, total depletion, intensity variation (and its pulsed analog), partial saturation, and the so-called kinetic method. A critical analysis of the conceptual foundations of these varied approaches is performed. The fundamental equations of each technique are derived from a general three-state kinetic model of excitation and decay. From this unified approach it becomes very clear where assumptions are made in the traditional derivations of the methods. Additionally, one comparative method, that termed relative actinometry, is discussed, since it may be treated in a unimolecular fashion consistent with the above approach. The only major ϵ/sub T/* method excluded from this review is that involving intermolecular energy transfer, a technique which has been thoroughly documented elsewhere.

47944 **Method and apparatus for continuous annular electrochromatography.** Scott, C.D. (to Dept. of Energy, Washington, DC). US Patent 4,683,042. 28 Jul 1987. Filed date 29 Apr 1986. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

A method is described for separation of solutes in an aqueous sample, comprising the steps of: (a) imposing an electrical potential gradient radially through a rotatable annulus comprised of an adsorbent material, the annulus having a first and a second end; then (b) introducing, at a predetermined point at the first end of the annulus, a fluid sample comprising at least one separable constituent while continuously rotating the annulus. The predetermined point is stationary relative to the rotating annulus; and thereafter (c) eluting the sample from the second end of the annulus such that the constituent is collected at the second end at a radial position r-bar which is determined as a function of r/sub f/, θ, V/sub e/ and ω, where θ=angular displacement of the constituent in the annulus; r/sub f/=distance of the predetermined point from the center of the annulus; V/sub e/=electrophoretic mobility of the constituent in the adsorbent material; and ω=rotational speed of the annulus.

47945 **Actinide recovery process.** Muscatello, A.C.; Navratil, J.D.; Saba, M.T. (to Dept. of Energy, Washington, DC). US Patent 4,683,124. 28 Jul 1987. Filed date 13 Jun 1985. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

A process is described for removing polymeric plutonium from aqueous solutions, comprising: (a) loading a solid solvent extractant on a solid inert support by melting the extractant and mixing it with the support; (b) contacting a feed solution containing plutonium polymer with the loaded support to remove the polymer from the solution; and (c) recovering the polymer from the loaded support; wherein the solid solvent extractant is selected from the group consisting of trioctylphosphine oxide, octylphenyl-N,N-diisobutylcarbamoylmethylphosphine oxide, tri-phenylphosphine oxide, thenoyltrifluoruacetone, crown ethers, and mixtures.

47946 **Capillary supercritical fluid chromatography (SFC) and SFC/MS.** Wright, B.W.; Smith, R.D. (Pacific Northwest Lab., Richland, WA). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—). Contract AC06-76RL01830.

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

The high solvating power, high solute diffusivity, and low viscosity of supercritical fluids provide significant advantages for mobile phases in chromatography. Solutes generally restricted to liquid chromatography (nonvolatile or thermally labile) can be separated using supercritical fluid chromatography (SFC) at efficiencies approaching that of gas chromatography. The use of small diameter capillary columns with a low pressure drop allow long columns for maximum efficiency, the advantages of pressure programming to be fully exploited, and straightforward interfacing to mass spectrometry. In this presentation, a review and a description of the current state-of-the-art of capillary SFC and SFC-MS will be described. The use of other detectors (in addition to mass spectrometry) and the use of several fluid systems including binary mixtures will be demonstrated using a range of thermally labile and nonvolatile analytes. Present limitations and future directions will also be discussed.

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REFER ALSO TO CITATION(S) 47017, 47018, 47019, 47134, 47254, 47257, 47258, 47355, 47573, 47812, 47853, 47858, 47887, 47896, 48024, 48025, 48436, 48715, 48716, 49016, 49018, 49020, 49021, 49022, 49023, 49024, 49025, 49026, 49027, 49028, 49029, 49030, 49181

47947 **(DOE/ER/13582—1) Study of improved methods for predicting chemical equilibria: Technical progress report for the period July 1, 1986 to September 1, 1987.** Lenz, T.G.; Vaughan, J.D. (Colorado State Univ., Fort Collins (USA)). 1987. Contract FG02-86ER13582. 43p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014647.

We carried out a detailed study of the capabilities and limitations of two force field models (MMP2 and MOLBD3) for calculating thermodynamic properties of -diene and -ene hydrocarbons. New force field parameters were introduced for the MOLBD3 program for unsaturated five-member rings and for methylene-bridged compounds. We investigated the Diels-Alder condensation of 1,3-cyclopentadiene in the temperature range 273 to 500K by use of MOLBD3. Equilibrium constants, standard enthalpies of reaction, and standard entropies of reaction were calculated. The calculated results were compared with experimental data reported in the literature. Anthracene derivatives, maleic anhydride derivatives, and Diels-Alder adducts were synthesized and purified in preparation

for future experimental determination of equilibrium constants for various Diels-Alder reactions. The structure of the 9-phenylanthracene-maleic anhydride adduct was determined by x-ray crystallography. Equilibrium constants for the Diels-Alder reaction of 9-phenylanthracene and maleic anhydride in 1,2,4-trichlorobenzene were determined for seven temperatures between 124 and 175°C. 27 refs., 1 fig., 13 tabs.

47948 (DOE/ER/13674—1) **Theoretical studies of electron and proton transfer processes in fluids: Progress report, August 1986 to September 1987.** Kestner, N.R. (Louisiana State Univ., Baton Rouge (USA). Dept. of Chemistry). 1987. Contract FG05-87ER13674. 21p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000157.

Research involved studies of (1) Interaction of Hydrated Metal ions. Studies with model potentials are complete. We have demonstrated the distortion of hydration shells at high concentrations. (2) Water-Water Interactions and weak intermolecular forces, in general. The role of Basis Set Superposition Error (BSSE) on limiting accuracy has been demonstrated. New techniques are being used to remove the BSSE and evaluate if it overcorrects in atomic interactions. (3) Using Density Functional Theory a very large calculation on the iron dimer has been completed. (4) We have verified the pseudopotential results of Landman and Jortner for small water clusters. (5) We have performed very accurate calculations on sodium water clusters which have been observed experimentally in beams. These may be involved in photobleaching hydrated electrons. (6) Work on the conformation of several conducting polymer fragments show that some helical structure exists. 12 refs., 2 figs., 1 tab.

47949 (DOE/ER/60420—1, pp 45-55) **Griffin-Hill-Wheeler version of the Hartree-Fock equations.** Mohallem, J.R.; Dreizler, R.M.; Trsic, M. (Univ. of Sao Paulo, Brazil). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A Griffin-Hill-Wheeler version of the Hartree-Fock (GHW-HF) equations is presented and applied to the He and Be atoms using both Slater and Gaussian orbitals. The kernels are evaluated analytically and the GHW-HF equations are solved by iteration. The integration for the generator coordinate is obtained by discretisation emphasizing the continuous character of the GHW formulation. The results with the Slater 1s orbital for He reach the HF limit. When Gaussians are employed the results are better than published HF calculations with these orbitals. 2 figures, 3 tables.

47950 (DOE/ER/60420—1, pp 57-63) **Many-dimensional hydrogenlike wave functions and the quantum mechanical many-body problem.** Avery, J. (Univ. of Copenhagen, Denmark). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Solutions to the many-dimensional analogue of the Schroedinger equation for the hydrogen atom are used as a starting point for solving the many-particle Schroedinger equation for systems with Coulomb interactions. It is shown that zeroth-order solutions can be improved by means of perturbation theory, which is simplified by means of a sum rule.

47951 (DOE/ER/60420—1, pp 185-201) **Graph theoretical approach to Moebius systems in organic chemistry.** Randic, M.; Zimmerman, H.E. (Drake Univ., Des Moines, IA). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2). Contract W-7405-ENG-82.

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The authors present a graph theoretical approach to Moebius systems, extending the concept of conjugated circuits to cyclic arrays that involve a single phase inversion. The approach can be applied without difficulty to polycyclic systems, justifying validity of the 4n rule beyond the narrow class of monocyclic systems. One obtains expressions for the resonance energy of Moebius systems that frequently allow an assessment of the relative stabilities among different systems without use of a full numerical analysis. Given reliable computations allowing one to select parameters, the approach could be used quantitatively; however, its important value is at the conceptual level. It offers insights into structural components contributing to the molecular stability for some ground state organic systems as well as to the factors that govern numerous chemical reactions. In this paper they have analyzed a dozen conjugated alternant hydrocarbons having 4-, 6-, and 8-membered rings.

47952 (DOE/ER/60420—1, pp 203-218) **Stability of conjugated hydrocarbon ions.** Randic, M.; Nettleton, F.E. (Drake Univ., Des Moines, IA). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2). Contract W-7405-ENG-82.

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The authors consider the question of predicting the stability of hypothetical structures that are too large for ab initio calculations, too complex for simple MO calculations, and too few for reliable semiempirical SCF MO schemes. The problem is illustrated on a polycyclic conjugated cation having 21 carbon atoms. The analysis is general and applies to conjugated hydrocarbons and their ions for which it is not apparent whether they exhibit aromatic characteristics (and, if they do, to what extent). For the investigated polycyclic cation they find that to a large extent its aromatic components are canceled by its antiaromatic components resulting in an essentially nonaromatic system. The analysis, which is based on close examination of various contributing conjugated circuits, allows one to examine the partial role of the individual Kekule valence structures as well as to foretell the nature of both the positively and negatively charged system.

47953 (DOE/ER/60420—1, pp 219-226) **Graph approach to the gradient expansion of density functionals.** Kozlowski, P.M.; Nalewajski, R.F. (Jagiellonian Univ., Cracow, Poland). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A graph representation of terms in the gradient expansion of the kinetic energy density functional is presented. They briefly discuss the implications of the virial theorem for the graph structure and relations between possible graphs at a given order of expansion.

47954 (DOE/ER/60420—1, pp 227-238) **Graph theory in the study of metal cluster bonding topology: applications to metal clusters having fused polyhedra.** King, R.B. (Univ. of Georgia, Athens). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The energy levels in a delocalized two- or three-dimensional chemical structure are related to the eigenvalues of the graph representing the corresponding bonding topology. Such relatively crude but computationally undemanding graph theory-derived models provide a clear demonstration of the close relationship between two-dimensional aromatic systems such as benzene and three-dimensional aromatic systems such as deltahedral boranes, carboranes, and metal clusters. The basic building blocks for the three-dimensional aromatic systems are deltahedra, having no degree 3 vertices. Delocalized bonding in such systems having v vertices requires two electrons for a multicenter core bond as well as 2v electrons for pairwise surface bonding. A problem of particular interest is how metal cluster polyhedra can fuse together, leading ultimately to the infinite structures of the bulk metals. As a model for such processes the fusion of rhodium carbonyl octahedra is examined using graph theory.

47955 (DOE/ER/60420—1, pp 239-252) **Nonempirical self-consistent modified extended huckel calculations on heavy-metal systems. II. Electronic structure, bonding, and spectra of the binuclear $Pt_2(P_2O_5H_3)_4^{4-}$ ion.** Boudreaux, E.A.; Doussa, S.P.; Klobukowski, M. (Univ. of New Orleans, LA). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The binuclear $Pt_2(P_2O_5H_3)^{4-}_4$ ion has received considerable experimental investigation. Primary emphasis has been placed on explaining the intense green luminescence observed from solids and solutions under ultraviolet irradiation. A molecular orbital study is conducted to provide specific details of the molecular structure and its correlation with the observed luminescence.

47956 (DOE/ER/60420—1, pp 253-269) **Complex scaled local density calculations: a review of recent developments.** Krylstedt, P.; Elander, N.; Braendas, E. (Research Institute of Physics, Stockholm, Sweden). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

In this paper they review some recent developments of complex scaled local density models for treating shape resonances. The present scattering model is based on the static exchange plus polarization approximation, where they have the possibility to formally include continuum electron exchange with just the uppermost bound orbital or with all target electrons. This theory is then tested on the well known ^2P shape resonances in the Be^- and Mg^- metastable ions and the ^2D shape resonance in the e^- - Mg scattering system. From the above formulation of the scattering problem they calculate partial wave S-matrix or Green's function resonance poles that can be used to interpret structures due to shape resonances in the cross section. In this contribution, however, they limit the numerical investigation to the partial wave S-matrix pole information and its interpretation and connection to the shape resonance.

47957 (DOE/ER/60420—1, pp 271-276) **Investigation of the Lieb-Thirring lower bound to the electronic kinetic energy via an energy-density functional approach.** Csavinszky, P. (Univ. of Maine, Orono). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Lieb and Thirring derived a lower bound to the electronic kinetic energy of an N particle system. Using an energy-density functional approach, and the Ne atom as an example, the present work investigates the tightness of the bound both in its original form and in its modified forms.

47958 (DOE/ER/60420—1, pp 277-287) **Nonlocal correlation function G(1,2) in density functional theory.** Sierraalta, A.; Ludena, E.V. (Centro de Quimica, Caracas, Venezuela). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The authors have analyzed the nonlocal contribution A(1) = del$_1$ x del$_2$G(1,2) divides/sub 2→1/ to the kinetic energy density term for a few representative atomic systems in order to gain some insight into the factors which are responsible for the occurrence of shell structure. They have advanced a method for obtaining the nonlocal correlation function G(1,2) once A(1) is known. They discuss simple analytic approximations to A(1) and hence to G(1,2) which could be used for the construction of an energy density functional based on rho.

47959 (DOE/ER/60420—1, pp 289-297) **Generalized Kohn-Sham theory for low-energy electron scattering by atoms including relativistic effects.** Haberland, R.; Fritsche, L. (Institut fuer Theoretische Physik der Technischen Universitaet Clausthal, West Germany). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

As has been shown in a recent study by one of the authors (L.F.), it is possible to cast the total energy E of an N-electron system in a form such that the equations to be obeyed by the one-particle states used in the CI-expansions of the N-electron function attain the Kohn-Sham form if E is required to be stationary against variation of Psi. Hence, these Kohn-Sham-type equations apply to the ground state as well as to excited states, of which the (N + 1)-electron problem of electron scattering by atoms represents a special case. Once the calculational procedure is fixed, the new scheme is parameter-free and has been used to calculate elastic differential cross sections, scattering-induced electron polarization, and T- and U-parameters. In a previous study the scheme has successfully been applied to noble gases. The results presented here refer to open-shell as well as closed-shell target atoms like Na, K, Hg, Pb, and Bi. In either case they obtain good agreement with respective experiments.

47960 (DOE/ER/60420—1, pp 299-311) **Local density theory for dynamical correlation corrections to single particle excitations in semiconductors.** Pickett, W.E.; Wang, C.S. (Naval Research Lab., Washington, DC). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

It is well established that the local density approximation (LDA), which is used in a large majority of all solid state band structure studies, severely underestimates band gaps in nonmetals. Here they describe an extension to semiconductors of the local density theory for quasiparticle self-energies. In contrast to the standard Kohn-Sham procedure that applies rigorously only to ground state properties, this is a theory for the single-particle-like excitations of semiconductors. This approach includes the energy dependence within a local-density-dependent self-energy that is evaluated in the GW-approximation of Hedin. The essential feature is the incorporation of the semiconducting gap into the screening of the Coulomb interaction, which results in an increased energy dependence of the exchange-correlation hole. The resulting theory gives results for silicon and diamond bandgaps and valence bandwidths that are typically within 5% of the experimental value.

47961 (DOE/ER/60420—1, pp 313-323) **Application of the variational cellular method to semiconductors: the ZnS case.** Ferreira, L.G.; De Siqueira, M.L. (Universidade de Sao Paulo, Brazil). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The authors have developed a new version of the variational cellular method for the calculation of the electronic structure of polyatomic systems. It is a very attractive method for large systems, such as solids and large molecules, and capable of giving calculated results with a degree of precision at least as good as those obtained by Hartree-Fock calculations. They are now improving the method by the introduction of crystalline boundary conditions with the intention to apply it to the study of impurities in semiconductors. The results for the ZnS clusters simulating the pure crystal show that the method leads to a fairly consistent description of the bulk electronic structure.

47962 (DOE/ER/60420—1, pp 325-333) **Dielectric response to a donor ion in a Ga/sub 1-x/Al/sub x/As - GaAs - Ga/sub 1-x/Al/sub x/As quantum well of finite depth.** Csavinszky, P.; Elabsy, A.M. (Univ. of Maine, Orono). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The authors consider the dielectric response to a donor ion in GaAs quantum wells of finite depths in two cases: (1) the ion is placed at the center of the well, (2) the ion is placed in off-center positions in the well. In each of these cases they calculate the binding energy of the donor atom for several well depths as a function of the width of the well and compare their values with those that arise when the donor atom is considered a hydrogenic impurity. They find that consideration of the dielectric response of the GaAs quantum well leads to deviations with respect to the hydrogenic theory. Specifically, they find that, in case (1), at a given well depth, their binding energies at the same well widths are larger in magnitude than those calculated from the hydrogenic theory. They also find that the discrepancy between the two sets of binding energies is a function of the width of the well, becoming less pronounced as the width of the well is increased.

47963 (DOE/ER/60420—1, pp 367-376) **Electron momenta in molecules and low-dimensional solids.** March, N.H. (Univ. of Oxford, England). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Relations between wave-mechanically calculated moments of momentum <p/sup n/> with n = 2, 1, and -1, for some light diatoms are first compared with electron density approximations given by I/sub n/ = integral{p(r)}/sup 1+n/3/. Whereas the ratios <p/sup n/}/I/sub n/ are predicted by semiclassical theory as 5.74, 2.32, and 0.48, respectively, the calculated values with densities of Hartree-Fock-Roothaan quality are 6.36, 2.38, and 0.42, respectively. Polyatomics, including the almost spherical XH/sub n/ molecules, are then considered, with some attention focusing on methane, followed by a comparison between some empirical results for the Compton profile of hydrocarbons and the bond profile C-H related to the methane Compton line shape. Some understanding of the empirical results of Eisenberger and Marra is thereby gained. After a brief discussion of momenta in graphite, they consider the electron-electron pair function of polyacetylene in momentum space in relation to that in a three-dimensional electron liquid, such pair correlation being related to plasmon dispersion.

47964 (DOE/ER/60420—1, pp 393-408) **New materials at high pressure.** McMahan, A.K. (Xerox Palo Alto Research Center, CA). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The application of pressure offers a means by which the electronic structure of solids may be dramatically altered, often causing one or more structural phase transitions at pressures easily accessible in the laboratory. Each new high pressure phase is in effect a new material with potentially new and interesting properties. Not only are such new phases of interest in their own right, but they also offer insight into possible structures that might occur in other materials at atmospheric pressure. Recent work on the compressed alkali, alkaline earth, rare earth, rare gas, and nitrogen solids is reviewed here with attention where possible to analogous phases known to exist at atmospheric pressure.

47965 (DOE/ER/60420—1, pp 409-435) **Aspects of linked cluster expansion in general model space many-body perturbation and coupled-cluster theory.** Mukherjee, D. (Indian Association for the Cultivation of Science, Calcutta). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

In this paper, a method of generating separable forms of the wave-operator for incomplete model spaces is discussed. With a time-dependent access to the many-body perturbation and coupled-cluster theories, it is shown how one can extract the regular part of the wave-operator which consists of linked cluster-operators only in the adiabatic limit. The procedure naturally suggests a hierarchy of lower valence model spaces P/sup (k)/, once a particular m-valence incomplete model space P/sup (m) is specified. The wave-operator Omega and the effective Hamiltonian H/sub eff/ are linked in this development and are valence-universal in the sense of being valid for P/sup (k)/'s, o ≦ k ≦ m. They have derived two distinct forms for Omega: (i) Omega = {exp(S)}, with {} as normal order with respect to suitable vacuum, where S are open operators inducing transitions from P(m) to outside it; (ii) Omega/sub N/ = {exp(S + X)}, where X are additional closed operators which are introduced to maintain isometry of Omega/sub N/: P/sup (k)/ Omega/sub N/ + Omega/sub N/P/sup (k)/ = P/sub (k)/. In neither of these choices do we have intermediate normalization. It is also possible to develop an alternative strategy with the complete model spaces, such that an effective valence-universal operator H may be found which generates roots, only a subset of which are equal to the eigenvalues of H. These subsets are the ones that H/sub eff/ would have furnished. This may thus be viewed as a Fock-space realization of the intermediate Hamiltonian approach.

47966 (DOE/ER/60420—1, pp 437-443) **Many-body perturbation theory and coupled cluster study of the water dimer.** Harrison, R.J.; Bartlett, R.J. (Univ. of Florida, Gainesville). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The interaction energy of two water molecules is evaluated at several levels of theory in a better than double zeta plus polarization basis set. Their CCSD + T(CCSD) results should be quite close to the full CI result in this case. Results are compared with variation-perturbation results for the dispersion energy. Counterpoise-corrected correlated results are used to examine the importance of basis set superposition effects in this system.

47967 (DOE/ER/60420—1, pp 445-453) **Direct calculation of excitation energies by the coupled-cluster method: Mg and Ar atoms.** Kaldor, U. (Tel Aviv Univ., Israel). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

An open-shell coupled-cluster method for the direct calculation of excitation energies is presented and applied to excitations of atomic Mg and Ar. The so-called CCSD + T approximation involves the exact inclusion of T_1 and T_2 operators and the lowest-order inclusion of T_3. Quasi-complete model spaces, built from determinants with one valence hole and one valence particle, are used. Two ionization potentials and 20 excitation energies are calculated. Good agreement with experiment (~ 0.2 eV) is obtained. The T_3 effects are less important than for the Be and Ne atoms.

47968 (DOE/ER/60420—1, pp 455-469) **Theoretical calculations of rate-determining steps for ignition of shocked, condensed nitromethane.** Bardo, R.D. (White Oak Lab., Silver Spring, MD). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Rates of intermolecular-to-intramolecular energy transfer and chemical reaction were determined by quantum mechanical calculations on systems of strongly interacting molecules at high shock pressure. The energy transfer rate was estimated by utilizing a theory of radiationless transitions which describes the coupling of a sparse set of internal mode energy levels with a quasicontinuum of intermolecular mode energy levels. An important quantity in this theory is the time t/sub pv/ required for activation of the internal modes. Calculated values of t/sub pv/ < 1 μsec are identified with the most efficient transfer of energy when the molecules interact and react bimolecularly in the head-to-tail configuration. These times are consistent with those found in shock experiments and those calculated by other techniques. A comparison of t/sub pv/ with chemical reaction half-lives indicates that energy transfer and reaction alternate as rate-determining steps over large ranges of P and T.

47969 (DOE/ER/60420—1, pp 483-493) **Quantum infinite order sudden approximation for ion-molecule reactions: treatment of the He + H_3^+ system.** Baer, M.; Nakamura, H.; Kouri, D.J. (Institute for Molecular Science, Myodaiji, Japan). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

In this work the ion-molecule reaction He + H_3^+ (v/sub i/) → HeH^+ (v/sub f/) + H(v/sub i/ = 0-7, v/sub f/ = 0-2) was studied quantum mechanically in the energy range 1.3 eV ≦ E/sub tot/ ≦ 1.8 eV. The calculations were carried out employing the Reactive Infinite Order Sudden Approximation (RIOSA). The two features characteristic of this system in the above energy range, namely the strong enhancement of the reaction rate with the initial vibrational energy (at a fixed total energy) and the relatively weak dependence of the cross sections on translational energy, were found to be well reproduced in the numerical treatment. The results also revealed the existence of two mechanisms of the exchange process: one is the ordinary mechanism and the other is probably related to the spectator stripping model.

47970 (DOE/ER/60420—1, pp 495-506) **Dynamics calculations of kinetic isotope effects for the reactions of muonium atoms with F_2 and Cl_2.** Steckler, R.; Truhlar, D.G.; Garrett, B.C. (Univ. of Minnesota, Minneapolis). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Variational transition state theory with semiclassical ground-state transmission coefficients is applied to calculate reaction rate constants, activation energies, and kinetic isotope effects for the protium(H) and muonium (Mu) cases of H + F_2 → HF + F and H + Cl_2 → HCl + Cl. They examine four potential energy surfaces for H + F_2 and two for H + Cl_2. For H + F_2 there is an unresolved difference between the available experiments; the calculations are consistent with the Mu experiments of Fleming and coworkers and with the H experiment of Albright et al. but not with the H experiment of Homann et al. For H + Cl_2 the calculations based on the surface of Polanyi and coworkers are in good agreement with experiment, but those based on the surface of Last and Baer are not. For both reactions the Mu rate constants and the kinetic isotope effects are greatly enhanced by tunneling.

47971 (DOE/ER/60420—1, pp 507-520) **Construction and fitting of molecular potential energy surfaces and their use in vibration-rotation calculations.** Sutcliffe, B.T.; Tennyson, J. (Univ. of York, Heslington, England). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The state-of-the-art in non-empirical calculations of potential energy surfaces for small molecules is discussed, as is the present position with respect to the analytic fitting of such surfaces. The results of some nonempirical vibration-rotation calculations performed on such analytic surfaces are presented and compared with experimental results. An attempt is made to assess the extent to which present methods of electronic structure calculation and present analytic fitting methods are adequate to produce surfaces for the interpretation of high-resolution spectral data.

47972 (DOE/ER/60420—1, pp 521-527) **Reaction field effects on the electron distribution and chemical reactivity of molecules.** Karelson, M.M.; Katritzky, A.R.; Zerner, M.C. (Tartu State Univ., Estonian, USSR). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The authors examine the effects of macroscopic solvation using the self-consistent reaction field technique. On the basis of ab initio, INDO SCF, and INDO/CI calculations they conclude that the introduction of a dielectric media seems to have little effect on calculated geometries. However, the charge distribution is effected: the presence of dielectric media allows greater local charge to develop. The dissociation of hydrogen fluoride is examined. With electron correlation, HF dissociates homolytically in the gas phase, but heterolytically in a solvent of dielectric constant of 80.

47973 (DOE/ER/60420—1, pp 529-540) **Calculation of polymer elastic moduli using semiempirical methods.** Klei, H.E.; Stewart, J.J.P. (Air Force Academy, Colorado Springs, CO). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Extensional elastic moduli have been calculated for several organic high polymers based on the modified neglect of diatomic overlap (MNDO) Hamiltonian. Standard semiempirical methods, by application of the Born-von Karman boundary conditions, can be used to calculate heats of formation of polymer chain sections, or computational unit cells, called clusters. Unit cell heats of formation at elongated translation vectors, combined with experimental or estimated densities, allow for the calculation of elastic moduli. Two potential sources of error were identified: (a) finite geometry optimization can result in pseudorandom errors in the calculated heat of formation, and (b) anharmonic distortion can become significant at large strains. Errors due to both causes can typically be minimized if strains between 3 and 10% are selected. As expected, the calculated moduli, although higher than those observed experimentally, agree with longitudinal values for perfectly oriented systems.

47974 (DOE/ER/60420—1, pp 555-561) **Binding energies and peak intensities of light hydrocarbon molecules through TOM I. Methane and acetylene.** Campoy, G.; Poulain, E.; Morales, J.; Palma, A. (Universidad de Sonora, Hermosillo, Mexico). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Binding energies and peak intensities of methane and acetylene molecules are calculated using the transition operator method (TOM) adapted to ab-initio Hartree-Fock programs. The calculations were done for both systems with and without symmetry restrictions, and the results are analyzed within the framework of TOM. It is found that the symmetry constraints have an important role in the binding energies of the acetylene molecule but none in the methane molecule. The intensities were calculated using the generalized sudden approximation (GSA) and the dipolar approximation; those resulting intensities are compared and discussed for the core and valence orbitals. The results let them conclude that the GSA method is only applicable when comparing photoionization intensities of neighboring ionization energy orbitals.

47975 (DOE/ER/60420—1, pp 563-572) **OH-transition metal bonding.** Bauschlicher, C.W. Jr. (NASA Ames Research Center, Moffett Field, CA). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The bonding in both CuOH and AgOH has a covalent component that leads to a bent structure. The larger electrostatic stabilization in CuOH leads to a larger D/sub e/ (2.83 eV) compared with AgOH (2.20 eV). Using Ni_5OH to model chemisorption of OH on a Ni surface, they find that OH adsorption in the fourfold hollow of Ni(100) leads to an OH normal to the surface, while adsorption directly above a Ni atom leads to a tilted OH. These qualitative Ni_5OH calculations allow us to speculate on the observed variation of OH on metal surfaces.

47976 (DOE/ER/60420—1, pp 573-584) **SCF theory of continuum solvent effects representation II. Quantum chemical calculation of thermodynamic properties of some acid-base equilibria in solution.** Contreras, R.; Aizman, A. (Universidad de Chile, Santiago). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Further developments in the local reaction field (LRF) model of solvent effects are presented. The improved formalism, including dielectric saturation effects, permits a better description of the solvent polarization vector. As a result, the calculation of entropies of solvation is significantly improved with respect to the standard reaction field models, allowing a complete thermodynamic picture of ion solvation to be obtained. The calculated thermodynamic functions of solvation are combined with gas-phase proton affinities to yield theoretical estimates of solution equilibrium properties in some acid-base processes. Some preliminary results concerning the basicity of primary alkylamines in water are used to illustrate the reliability of the present approach.

47977 (DOE/ER/60420—1, pp 603-612) **Ab initio calculations of through-space nuclear spin-spin coupling constants with the IPPP method.** Scuseria, G.E.; Contreras, R.H. (Univ. of California, Berkeley). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

An ab initio version of the inner projections of the polarization propagator (IPPP) method to separate different transmission components of nuclear spin-spin coupling constants is presented. All four terms - Fermi contact, spin-dipolar, Paramagnetic spin-orbital, and diamagnetic spin-orbital-contributing to the interaction energy of the nuclear spins are considered and their through-space components analyzed for the ^{19}F-^{1}H coupling of 1-fluoro-propane with a double zeta (DZ) basis set. Results obtained qualitatively agree with experimental data.

47978 (DOE/ER/60420—1, pp 613-625) **Charge deformation maps, molecular moments, and high-energy electron scattering.** Fink, M.; Zhang, Y.; Bonham, R.A. (Univ. of Texas, Austin). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The authors review the progress which was made during the last 6 years in the attempts to use electron diffraction data to gain insights into the electronic charge densities of isolated molecules and their moments. In regard to theory, they investigated the sensitivity of the elastic differential high-energy cross sections to the basis sets in the wave function calculations. Extensive calculations on H_2O showed that there is no significant change by the molecular vibrations on the static charge density deformation maps. Finally new relations could be derived which allow the determinations of nuclear and electronic moments from the differential cross sections at small angles. In regard to experimental data, new sets of purely elastic cross sections are available for He, Ne, CO_2, N_2, and CH_4, which are compared with Hartree-Fock and limited configuration interaction wave function results. The differences are discussed. New experimental values for some moments for N_2 and CH_4 are reported.

47979 (DOE/ER/60420—1, pp 657-663) **Mechanism of activation of coordinated olefins toward nucleophilic attack.** Cameron, A.D.; Smith, V.H. Jr.; Baird, M.C. (Queen's Univ., Kingston, Ontario). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Attack by hydride sources such as the borohydride ion on complexes of the type $[CpFe(CO)_2(olefin)]^+$ yields alkyl compounds of the $CpFe(CO)_2R$. The mode of activation of the coordinated olefin ligands toward an incoming hydride nucleophile is investigated theoretically by utilizing extended Hueckel and INDO methodologies. It was found that, of the two, the INDO approach yields reasonably accurate estimates of the energies of the ethylene frontier orbitals, and that activation (as measured by the extent of interaction between the hydride 1s orbital and the coordinated ethylene) of the ethylene on coordination can occur because the ethylene π^* orbital is considerably stabilized relative to the free ethylene π^* orbital energy.

47980 (DOE/ER/60420—1, pp 681-687) **Rotational distributions from resonances in H + H_2.** Bowman, J.M. (Illinois Institute of Technology, Chicago). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Rotational distributions of the product H_2 formed in resonant scattering of H + H_2 are presented based on an extension of the reduced dimensionality theory of reactive scattering. The reduced dimensionality theory is based on an adiabatic treatment of the three-atom bending motion in the strong interaction region. The final rotational distributions are obtained by making a simple Franck-Condon projection of the bending states onto the final rotational states of the product H_2. They focus in particular on the rotational distributions which may result from bend-excited resonances which have been recently identified in this system.

47981 (DOE/ER/60420—1, pp 689-697) **Variationally improved transition amplitudes from time-dependent Hartree-Fock wave functions: application to He + He^{2+} collisions.** Gazdy, B.; Micha, D.A. (Univ. of Florida, Gainesville). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A variational functional is introduced to calculate transition amplitudes. It satisfies microscopic reversibility and is independent of the overall phases of the wave functions. Using time-dependent Hartree-Fock (TDHF) states, constructed from MO-LCAOs and evolving forward and backward in time, they compare exact numerical results with results from the variational functional for collisions of He and He^{2+}, obtained with a minimal basis set. Transition probabilities versus impact parameters and cross sections versus collisions energies in the range of 30-100 keV are computed for elastic and two-electron transfer processes. The variational functional method leads to a substantial improvement over the standard TDHF results.

47982 (DOE/ER/60420—1, pp 699-742) **Solved and unsolved problems of chemical graph theory.** Trinajstic, N.; Klein, D.J.; Randic, M. (Texas A & M Univ., Galveston). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The development of several novel graph theoretical concepts and their applications in different branches of chemistry are reviewed. After a few introductory remarks they follow with an outline of selected important graph theoretical invariants, introducing some new results and indicating some open problems. They continue with discussing the problem of graph characterization and construction of graphs of chemical interest, with a particular emphasis on large systems. Finally they consider various problems and difficulties associated with special subgraphs, including subgraphs representing Kekule valence structures. The paper ends with a brief review of structure-property and structure-activity correlations, the topic which is one of prime motivations for application of graph theory to chemistry.

47983 (DOE/ER/60420—1, pp 749-761) **Ab-initio MO electronic structure calculations of defect-pair complexes in silicon.** Gomes, V.M.S.; Assali, L.V.C.; Leite, J.R. (Instituto di Fisica da Universidade de Sao Paulo, Brazil). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Ab-initio self-consistent electronic structure calculations have been carried out for some pair complexes of defects in silicon: V_s, $V_s + O_s$, $V_s + O$ and B/sub s/ + H/sub i/. The obtained results for the oxygen-related complexes provide a quantitative confirmation of the accepted microscopic models for these centers. For the B/sub s/ + H/sub i/ pair the results indicate that the boron shallow acceptor activity is neutralized, and the calculated values for the vibrational frequencies of the complex are fully consistent with the results of recent infrared experiments.

47984 (DOE/ER/60420—1, pp 763-765) **Molecular dynamics simulations of energy transfer in shocked molecular systems.** Karo, A.M.; Hardy, J.R. (Lawrence Livermore National Lab., CA). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2). Contract W-7405-ENG-48.

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Shocks propagating through chemically reactive media can induce self-sustaining reactions. Molecules in the shocked material are subjected to sudden, coherent excitation. The forces on the atoms of the molecule have defined phase relationships. The phase shifts are determined by the geometry of the molecule and the geometry of the surrounding medium.

47985 (DOE/ER/60517—1) **Energy transformation in molecular electronic systems: Research progress report for the period December 1, 1986-November 30, 1987.** Kasha, M. (Florida State Univ., Tallahassee (USA). Inst. of Molecular Biophysics). 1 Aug 1987. Contract FG05-87ER60517. 9p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013916.

The main research activity on our project continues to be the very active field of proton-transfer spectroscopy. Categories of research are: (1) Systematics of Proton-Transfer classes; (2) Picosecond Spectroscopy of Proton-Transfer in Lumichrome (a photolysis product of riboflavin); (3) Proton-Transfer Laser Research; (4) Computer Calculations on Proton-Transfer Systems; and (5) Unscheduled Research. New facets of the research program are: (1) Charge-Transfer (CT) Perturbation of Proton-Transfer Spectroscopy; (2) Super Computer Calculations on Proton-Transfer; (3) Dielectric Effects on Extended Dipoles in Proton-Transfer Spectroscopy; and (4) Proton-Transfer in Biological Systems.

47986 (DOE/HWP—23) **A useful by-product expert system.** Allen, J.D. Jr.; Thiessen, W.E. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 29p. (ORNL/TM—10178). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000044.

This report describes the status of and prospects for the success of various tasks undertaken to enable an expert system program written both to perform chemical synthesis of complex organic compounds and to operate in the reverse chemical direction; that is, to develop paths to convert existing compounds into simpler, nontoxic products. The principal tasks undertaken this past year included (1) completing the synthesis program and (2) beginning modifications to enable it to run in the reverse direction. These tasks were completed along with several additional ones: refining the chemical knowledge bases, tuning the code for increased speed, providing for some sensitivity to chemical clues to toxicity, removing synthesis bias from the chemical knowledge bases, and defining execution endpoint criteria. 2 refs., 2 figs.

47987 (INIS-mf—10681) **Studies of the reactions of uranium pentabromide and hexabromouranate(V) in non-aqueous solvents.** Dehos, R.F. (Technische Univ. Muenchen, Garching (Germany, F.R.). Fakultaet fuer Chemie, Biologie und Geowissenschaften). 12 Jul 1984. 153p. (In German). NTIS (US Sales Only), PC A08/MF A01. File Number DE87752789.

With the help of IR and electron spectra, the behaviour of uranium pentabromide and hexabromo uranate in non-aqueous nitromethane, nitroethane, bromine, dichlormethane, dibromomethane and acetonitrile was studied. By comparison of the spectra of the solutions in nitromethane with the solutions using other solvents on one side, and on the other side with the solids spectra of the end products, the redox reactions of the uranium V in nitromethane solutions could be more than clarified. Studies were also carried out on the time-dependency of the uranium IV and uranium V contents of the solutions at room temperature and at -20/sup 0/C. The existence of the HUBr/sub 6/ which probably appears as an intermediate product was tested in another experiment. First evidence for the existence of UBr/sub 6/ as a disproportionation product of UBr/sub 5/ were achieved by tests in solutions of acetonitrile at -47/sup 0/C.

47988 (K/PS—1260-Rev.1) **Density of dilute solutions of HF and other impurities in UF_6.** Barber, E.J. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). Aug 1987. Contract AC05-84OT21400. 22p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014562.

The density data on dilute solutions of hydrogen fluoride (HF), dichlorotetrafluoroethane (R-114), trichlorotrifluoroethane (R-113), 2,2,3-trichoropheptatfluorobutane (C437), and perfluorodimethylcyclohexane (C816) in UF_6 measured by W.D. Hedge have been re-examined using the additivity rule. For HF-UF_6 solutions, the large separation factor for HF from the liquid to the vapor phase required recalculation of the actual liquid compositions before the densities of the solutions of HF in UF_6 could be correctly estimated. The correlation between the densities calculated by the additivity rule using the densities of the pure components and the experimental results is acceptable for each solute. With R-113, C437, and C816 using values for the molar volumes estimated from the experimental data will give better fits. It should be noted that there is a poorly determined experimental point at solute mol fraction between 0.002 and 0.004 in all the systems, except for the C816-UF_6 one, where the error or the worst point, which is at approximately the same mol fraction as the other systems, is not much larger than the overall error. 15 refs., 10 figs., 6 tabs.

47989 (LBL—23614) **A bonding model for strong generalized Lewis acid-base interactions in intermetallics.** Brewer, L. (Lawrence Berkeley Lab., CA (USA)). May 1987. Contract AC03-76SF00098. 10p. (CONF-8705184—1). NTIS, PC A03. File Number DE87014128.

From 5. international conference on high temperature and energy-related materials; Rome, Italy (25 May 1987).

Titrations of palladium and rhodium by niobium have been carried out by determining the activity of niobium in alloys using high-temperature solid-electrolyte cells and by phase equilibria with oxides, carbides, and nitrides. The titration curve of niobium activity as a function of composition indicated a large crystal field effect with the two non-bonding pairs of palladium having substantially different base strengths. The non-bonding pair of rhodium is intermediate in base strength between the two pairs of palladium. At low concentrations of niobium, palladium is a stronger base, but rhodium becomes stronger at higher niobium concentrations. Additional measurements are in progress for various combinations of 3d, 4d, and 5d elements to provide the information needed for an adequate crystal field model that could provide prediction of bonding capabilities. 16 refs.

47990 (LBL—23804) **The effect of additives on the reactivity of palladium surfaces for the chemisorption and hydrogenation of carbon monoxide: A surface science and catalytic study.** Rucker, T.G. (Lawrence Berkeley Lab., CA (USA)). Jun 1987. Contract AC03-76SF00098. 195p. NTIS, PC A09/MF A01; 1; GPO Dep. File Number DE87014685.

This research studied the role of surface additives on the catalytic activity and chemisorptive properties of Pd single crystals and foils. Effects of Na, K, Si, P, S, and Cl on the bonding of CO and H and on the cyclotrimerization of acetylene on the (111), (100) and (110) faces of Pd were investigated in addition to role of TiO_2 and SiO_2 overlayers deposited on Pd foils in the CO hydrogenation reaction. On Pd, only in the presence of oxide overlayers, are methane or methanol formed from CO and H_2. The maximum rate of methane formation is attained on Pd foil where 30% of the surface is covered with titania. Methanol formation can be achieved only if the TiO/sub x//Pd surface is pretreated in 50 psi of oxygen at 550°C prior to the reaction. The additives (Na, K, Si, P, S, Cl) affect the bonding of CO and hydrogen and the cyclotrimerization of acetylene to benzene by structural and electronic interactions. In general, the electron donating additives increase the desorption temperature of CO and increase the rate of acetylene cyclotrimerization and the electron withdrawing additives decrease the desorption temperature of CO and decrease the rate of benzene formation from acetylene.

47991 **(MLM—3451) Mound activities in chemical and physical research: January-June 1987.** (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 10 Sep 1987. Contract AC04-76DP00053. 41p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014999.

The following were studied: calcium chemical exchange, chlorine isotopic thermal diffusion of alkyl chlorides, bicarbonate process for Ca isotope enrichment, plutonium chemistry, and thermal diffusion of He-CO_2 and Xe-CO_2 mixtures. (DLC)

47992 **(NP—7770317) Supercritical aqueous systems under high pressure. A statistical-thermodynamical equation of state and experimental investigations.** Christoforakos, M. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Physik). 15 Feb 1985. 181p. (In German). NTIS (US Sales Only), PC A09. File Number DE87770317.

In the experimental part of the investigation, the phase boundaries of the water/methane system were investigated in a high-pressure, high-temperature autoclave at 500 to 2400 bar and 200degC to 420degC using the synthetic method. Isopleths of the system, which has an interrupted critical curve, were measured optically and by the salient-point method. The measurements, together with previous data gained on the same system, were used in the second, theoretical section for validating the newly developed equation of state for fluid mixtures. In the theoretical part, an equation of state was developed for the purpose of describing fluid mixtures of relatively small, near-spherical molecules with a strong polar component over a wide range of pressures and temperatures. The recent findings in statistical/thermodynamic disturbance theory and in computer simulation of fluids were taken into account. The equation of state is based on a model of soft spheres with a 'square-well' attraction term. Multicomponent phases can be described by introducing suitable rules for mixtures.

47993 **(ORNL—6398) Iterative solution of a nonlinear system arising in phase change problems.** Williams, M.A. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 84p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87014672.

This paper considers several iterative methods for solving the nonlinear system arising from an enthalpy formulation of a phase change problem. Implicit discretization of the governing equations results in a mildly nonlinear system at each time step. We discuss solving this system using Jacobi, Gauss-Seidel, and SOR iterations and a new modified preconditioned conjugate gradient (MPCG) algorithm. The new MPCG algorithm and its properties are discussed in detail. Numerical results are presented comparing the performance of the SOR algorithm and the MPCG algorithm with 1-step SSOR preconditioning. The MPCG algorithm exhibits a superlinear rate of convergence. The SOR algorithm exhibits a linear rate of convergence. Thus, the MPCG algorithm requires fewer iterations to converge than the SOR algorithm. However, in most cases, the SOR algorithm requires less total computation time than the MPCG algorithm. Hence, the SOR algorithm appears to be more appropriate for the class of problems considered.

47994 **(SAND—87-1205C) Field desorption of intermediates in the rhodium carbonyl formation reaction.** Kellogg, G.L. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 6p. (CONF-870780—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014851.

From 34. international field emission symposium; Osaka, Japan (13 Jul 1987).

The formation of Rh carbonyl reaction intermediates resulting from the interaction of gas phase CO with Rh field emitter tip surfaces has been investigated with the imaging atom-probe. A Rh tip was placed in a background of $\sim 10^{-7}$ Torr CO and heated to temperatures between 400 and 500 K. As the carbonyl formation reaction proceeded, surface species were field desorbed and mass analyzed. The primary species detected were singly-charged CO and doubly-charged Rh, Rh(CO), $Rh(CO)_2$, and $Rh(CO)_3$. Measurement of the temperature dependence of the various ion signals indicated that all species except $Rh(CO)_2^{++}$ desorbed with approximately the same activation energy (1.0 to 1.3 eV). This result, combined with a consistent CO/Rh ratio of 3 for all mass scans, suggests that these signals were produced by fragmentation of a $Rh(CO)_3$ parent molecule. The $Rh(CO)_2^{++}$ signal was found to disappear at higher temperatures suggesting that it was due to an intermediate in a stepwise reaction sequence. Over the narrow field range investigated (1.5 to 2.0 V/A), the activation energies for desorption were independent of the applied field. Time-gated images of the various desorbed ions indicated enhanced desorption around the (100) pole, but no real structural sensitivity in the formation of the reaction intermediates could be identified.

47995 (ZfK—590, pp 47-48) **Synthesis von 6β-bromocholesta-1,4-dien-3-on.** Roemer, J.; Kunz, G. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

47996 **Electronic states of Si_2 and Si^-_2 as revealed by photoelectron spectroscopy.** Nimlos, M.R.; Harding, L.B.; Ellison, G.B. (Department of Chemistry and Biochemistry, University of Colorado, Boulder, Colorado 80309—0215). *Journal of Chemical Physics;* **87**: No. 9, 5116-5124(1 Nov 1987).

We have measured the photoelectron spectrum of Si^-_2 and find that the molecular electron affinity is $EA(Si_2)$ = 2.199 +- 0.012 eV. This spectrum apparently involves multiple electronic states of the Si^-_2 ion as well as several electronic states of the final neutral, Si_2. In order to unravel our experimental findings, we have carried out ab initio MCSCF+1+2 CI calculations on both species. These calculations suggest that there are two nearly degenerate states for both Si_2 and Si^-_2. We can fit our experimental data by assuming detachment from two states of Si^-_2 :X (^{2}Pi) [r/sub e/ = 2.187 A] and A ($^2\Sigma^+$/sub g/) [T_0 = 0.117 +- 0.016 eV, r/sub e/ = 2.127 A]. We observe two final states of Si_2: X ($^3\Sigma^-$/sub g/) [r/sub e/ = 2.246 A] and A (^{3}Pi/sub u/) [T_0 = 0.053 +- 0.015 eV, r/sub e/ = 2.171 A]. These assignments are confirmed by an experimental study of the angular distributions of the photodetached electrons.

47997 **Comparison of DODCI fluorescence depolarization in glycerol and ethylene glycol: Effect of orientational correlation on excitation transport.** Anfinrud, P.A.; Struve, W.S. (Department of Chemistry and Ames Laboratory—USDOE Iowa State University, Ames, Iowa 50011). *Journal of Chemical Physics;* **87**: No. 8, 4256-4262(15 Oct 1987). Contract W-7405-ENG-82.

Time-correlated single-photon counting was used to obtain anisotropic fluorescence profiles for DODCI in ethylene glycol. Rotational diffusion of DODCI in this solvent was characterized at a concentration of -10^{-6} M, where minimal electronic excitation transport occurs during the dye fluorescence lifetime. The fluorescence depolarization due to excitation transport at higher concentrations was separated from that due to rotational diffusion; analysis of our data yields excellent agreement with current transport theories. The discrepancies observed between these theories and our earlier DODCI experiments in glycerol [J. Chem. Phys. 86, 2689

(1987)] appear to originate from orientational correlation of neighboring chromophores in that solvent; glycerol exhibits remarkable coherence in its total radial distribution function out to separations as large as 25 A at temperatures between 250 and 350 K [Z. Naturforsch. Teil A 36, 1045 (1981)].

47998 **Upper and lower bounds for the rate of diffusion-controlled reactions.** Richards, P.M.; Torquato, S. (Sandia National Laboratories, Albuquerque, New Mexico 87185-5800). *Journal of Chemical Physics;* **87**: No. 8, 4612-4614(15 Oct 1987).

Recent upper and lower bounds established by the authors for the rate to diffuse to traps in a random medium are compared in a consistent manner by taking account of how the trap-free volume affects various definitions of the rate constant.

47999 **Modulated molecular-beam studies of the surface chemistry of silicon reaction with reactive gases.** Olander, D.R.; Balooch, M.; Abrefah, J.; Siekhaus, W.J. (Materials and Chemical Sciences Division, Lawrence Berkeley Laboratory and Department of Nuclear Engineering, University of California, Berkeley, California 94720). *Journal of Vacuum Science and Technology, B: Microelectronics Processing and Phenomena;* **5**: No. 5, 1404-1409(Sep 1987). Contract AC03-76SF00098;W-7405-ENG-48.

The method of studying the kinetics of gas—solid surface reactions using modulated molecular beams and mass-spectrometric detection is described. Results obtained for Si(111) etching by H(g) and deposition from SiH_4 are presented.

48000 **Characterization of the charge-transfer reaction between decamethylferrocene and 7,7,8,8-tetracyano-p-quinodimethane (1:1). The ^{57}Fe moessbauer spectra and structures of the paramagnetic dimeric and the metamagnetic one-dimensional salts and the molecular and electronic structures of [TCNQ]/sup n/ (n = 0, -1, -2).** Miller, J.S.; Zhang, J.H.; Reiff, W.M.; Dixon, D.A.; Preston, L.D.; Reis, A.H. Jr.; Gebert, E.; Extine, M.; Troup, J.; Epstein, A.J.; Ward, M.D. (E. I. du Pont de Nemours & Co., Inc., Wilmington, DE). *Journal of Physical Chemistry;* **91**: No. 16, 4344-4360(30 Jul 1987).

The charge-transfer reaction of decamethylferrocene, $Fe(C_5Me_5)_2$, Fc^*, and 7,7,8,8-tetracyano-p-quinodimethane, TCNQ, has been characterized. Three major reaction products of varying stoichiometry, conductivity, and magnetism are formed: a 1-D metamagnetic 1:1 salt, $[Fc^*]^+[TCNQ]^-$; a paramagnetic $[Fc^*]^{2+}[TCNQ]^{2-}$; 1:1; dimeric salt, $[Fc^*]^{2+}[TCNQ]^{2-}$; and a conducting 1:2 salt of $[Fc^*]^+[TCNQ]^{2-}$ composition. The crystal and molecular structures of the 1:1 paramagnetic dimeric and metamagnetic one-dimensional salts were solved. The ions in the dimeric phase crystallize in the centrosymmetric monoclinic space group $P2_1/c$ with a = 9.708 (1) A, b = 12.211 (2) A, c = 23.585 (4) A, β = 95.01 (1)°, Z = 4, and R = 0.058 for 3665 independent reflections. The magnetic susceptibility of powder samples of $[Fc^*]^{2+}[TCNQ_2]_2^{2-}$ obeys the Curie expression above 1.5 K suggesting very little magnetic coupling between the intradimer S = 1/2 Fe(III)'s which are separated by ~14 A. The $[TCNQ]_2^{2-}$ dimer is strongly antiferromagnetically coupled. Ions in the linear chain metamagnetic phase crystallize in the centrosymmetric triclinic space group P1 vector. The unit cell at -106 °C is a = 8.635 (4) A, b = 9.384 (6) A, c = 10.635 (9) A; α = 116.76 (5)°, β = 112.58 (5)°, γ = 72.49 (4)°, V = 701.8 A^3, Z = 1, and R/sub w/ = 0.060 for 1156 reflections. The one-dimensional phase exhibits metamagnetic properties with a Neel temperature of 2.55 K. The intrachain Fe/sup III/-Fe/sup III/separation is 10.540 A. The calculated structure and scaled vibrational frequencies are in excellent agreement with the observed values.

48001 **Variation of alkylmethylviologen radical cation-water interactions in micelles and vesicles from ESEM spectroscopy: effect of alkyl chain length.** Colaneri, M.J.; Kevan, L.; Thompson, D.H.P.; Hurst, J.K. (Univ. of Houston, TX). *Journal of Physical Chemistry;* **91**: No. 15, 4072-4077(16 Jul 1987). Contract AS05-80ER10745.

The variation in alkylmethylviologen radical cation-water interactions with the alkyl chain length in frozen sodium dodecyl sulfate (SDS) micelles and dihexadecyl phosphate (DHP) vesicles were investigated by electron spin echo modulation spectroscopy. In the DHP vesicle system, the measured deuterium modulation depth associated with deuteriated water indicated a significant decrease in the magnitude of these interactions with an increase in the alkyl chainlength of the viologen. However, a comparable trend was absent in the SDS micelle system. In addition, the strength of the dimethylviologen radical cation-water interactions in SDS micelles was much weaker than those measured for any of the viologen radicals in the vesicle system. These observations were found to be in qualitative agreement with currently proposed models of the binding characteristics of alkylmethylviologens to DHP vesicles and SDS micelles and may also reflect structural differences between these two types of assemblies.

48002 **Electrical conductivity, viscosity, and density of a two-component ionic system at its critical point.** Schreiber, D.R.; Conceicao, M.; de Lima, P.; Pitzer, K.S. (Lawrence Berkeley Lab., CA). *Journal of Physical Chemistry;* **91**: No. 15, 4087-4091(16 Jul 1987). Contract AC03-76SF00098.

The density, viscosity, and electrical conductivity of a system composed of a fused salt in a low dielectric constant solvent were examined at a temperature just above the liquid-liquid critical point. The system examined was tetra-n-butylammonium picrate (TNBAP) in 1-chloroheptane. The conductivity decreased to a minimum near 0.001 mol/dm^3 and then increased rapidly through the region of the critical concentration. The data in the region of the minimum were fit by using the method of Fuoss and Kraus to determine the ion-pair and ion-triplet dissociation constants. An extrapolation of these equilibria toward the critical region indicated a rapidly increasing importance of ion triplets at the expense of the neutral ion pairs. The conductivity results were also compared to a recent cluster-equilibrium treatment of the restrictive primitive model (RPM). This treatment of the RPM also shows an increasing importance of charged clusters, at the expense of neutral clusters, as the concentration approaches that of the critical point. The dielectric constant of 1-chloroheptane was also measured over a range of temperature.

48003 **Dynamics of the reactions of CH_3i, CH_2^+, and CH^+ with acetylene.** Sharma, R.B.; Semo, N.M.; Koski, W.S. (Johns Hopkins Univ., Baltimore, MD). *Journal of Physical Chemistry;* **91**: No. 15, 4127-4131(16 Jul 1987).

The reactions of CH_3^+, CH_2^+, and CH^+ with acetylene to produce C_3 ionic products were investigated by measuring the angular distributions of ion product velocities, reaction cross sections, and deuterium isotope distributions. The reactions appear to be proceeding by two different mechanisms. The lifetimes of the intermediate complexes as judged from the deuterium distributions are significantly smaller than the rotational periods of the systems. Measurements of the energies of the ionic reactants and products show that a large amount of internal energy can be present in the $C_3H_3^+$ ion.

48004 **Reactions of iron porphyrins with CF_3, CF_3O_2, and CBr_3O_2 radicals.** Brault, D.; Neta, P. (National Bureau of Standards, Gaithersburg, MD). *Journal of Physical Chemistry;* **91**: No. 15, 4156-4160(16 Jul 1987).

The reactions of ferric and ferrous deuteroporphyrin (PFe/sup III/, PFe/sup II/) with alkyl and peroxyl radicals derived from CF_3Br and CBr_4 were studied by kinetic spectrophotometric pulse radiolysis in aqueous alcohol solutions. PFe/sup II/ reacts with CF_3 radical at nearly diffusion controlled rate ($k = 2 \times 10^9$ M^{-1} s^{-1}) to form a metal-carbon bonded complex. The PFe/sup III/CF_3 adduct subsequently reacts with another PFe/sup II/ ($k = 5 \times 10^8$ M^{-1} s^{-1}) presumably to form the carbene intermediate PFe/sup II/CF_3 which further hydrolyzes. The final products are PFe/sup III/ and PFe/sup II/CO. CF_3 radicals also react with PFe/sup III/ ($k = 4.5 \times 10^8$ M^{-1} s^{-1}) to yield an oxidized product. The initial product undergoes a slow reaction ($k = 2.8 \times 10^3$ s^{-1}) ascribed to ligand exchange. CBr_3 radicals do not react with PFe/sup III/ with reaction rate constants of 3.9×10^9 and 2.8×10^8 M^{-1} s^{-1}, respectively. Similar reactions were reported for other peroxyl radicals. These reactions were used in competition kinetic experiments to obtain the rate constants for hydrogen abstraction from linolenic

acid. The rate constants for the reaction of linolenic acid with CF_3O_3 and CBr_3O_2 are 6.9 x 10^6 and 1.2 x 10^6 M^{-1} s^{-1}, respectively. The reactions are discussed with regard to the reactivity and possible toxicity of halogenated compounds.

48005 **Vapor pressure isotope effects in liquid methylene difluoride.** Kanungo, A.; Oi, T.; Popowicz, A.; Ishida, T. (State Univ. of New York, Stony Brook). *Journal of Physical Chemistry;* **91**: No. 15, 4198-4203(16 Jul 1987). Contract AC02-80ER10612.

The vapor pressures of the isotopic methylene difluorides $^{12}CH_2F_2$, $^{13}CH_2F_2$, and $^{12}CD_2F_2$ have been measured at temperatures between 149.36 and 244.82 K by differential manometric techniques in a precision cryostat. Throughout the whole temperature range of the measurement, P($^{12}CH_2F_2$) > P($^{13}CH_2F_2$) > P($^{12}CD_2F_2$). The data are best represented by T ln (f/sub c//f/sub g/) = -(31.64 +/- 1.97)/T - (0.4069 +/- 0.0107) for the $^{12}C/^{13}C$ effect and by T ln (f/sub c//f/sub g/) = (632.26 +/- 97.62)/T - (19.175 +/- 1.016) - (0.0532 +/- 0.0025)T for the H/D effect. The vapor pressure of the natural abundance methylene difluoride is given by log P(Torr) = 7.1990 - 842.31/[t(°C) + 246.81]. The normal H/D vapor pressure isotope effect (VPIE) in liquid methylene difluoride is due to the zero-point energy shift upon condensation of the deuterio species being greater than that of the protio species, a fact which is also found for the H/D VPIE's in liquid methyl fluoride and fluoroform. The H/D effect in methylene difluoride is unusually higher than those found in methyl fluoride and fluoroform due to an enhanced perturbation of the C-H stretching modes by a relatively large intermolecular force in liquid methylene difluoride. Results of the normal-coordinate analyses of the cell model are presented. Temperature dependency of the external-internal interaction force constants is a necessary requirement for the satisfactory reproduction of the observed H/D and $^{12}C/^{13}C$ VPIE's and spectroscopic data on the liquid.

48006 **Inelastic neutron scattering from tetramethylammonium cations occluded within zeolites.** Brun, T.O.; Curtiss, L.A.; Iton, L.E.; Kleb, R.; Newsam, J.M.; Beyerlein, R.A.; Vaughan, D.E.W. (Argonne National Lab., IL). *Journal of the American Chemical Society;* **109**: No. 13, 4118-4119(24 Jun 1987). Contract W-31-109-ENG-38.

The use of organic bases, for example, tetraalklylammonium hydroxides, and other organic reagents has greatly enhanced the scope of gel/solution synthesis routes to crystalline microporous materials such as zeolites. The role of these organic components, however, continues to be the topic of considerable debate. The organic components first modify the gel structural chemistry. The presence of tetramethylammonium (TMA) hydroxide, for example, promotes the formation of double four-ring units in silicate solutions. Occlusion of organic gel components in zeolite crystal structures, however, leads also to the concept of a templating effect in which the organic component provides a basis around which the developing zeolite cages form. The mechanism of this templating process remains somewhat ill defined and must, at least, be of variable specificity. The authors describe here the use of inelastic neutron scattering (INS) to measure TMA template torsional vibrations, vibrations that provide to be sensitive to the strength of the interaction between the template cation and the enclosing zeolite cage.

48007 **Picosecond excited-state solvation dynamics of 9,9'-bianthryl in alcohol solutions.** Anthon, D.W.; Clark, J.H. (Lawrence Berkeley Lab., CA). *Journal of Physical Chemistry;* **91**: No. 13, 3530-3536(18 Jun 1987).

Picosecond time-resolved emission spectroscopy has been used to measure the rate of charge transfer and solvation of 9,9'-bianthryl in several solvents and solvent mixtures. In nonpolar and aprotic polar solvents no rise times were detected, indicating that all charge transfer and solvation occur within the 10-ps experimental resolution. In linear alcohols, complex biexponential fluorescence rise times are seen. These are interpreted in terms of an initial charge transfer (~ 30-60 ps) forming a weakly solvated charge-transfer state which subsequently (~ 50-500 ps, increasing with solvent viscosity) reacts with the solvent to form a hydrogen-bonded exciplex. Evidence or hydrogen bonding comes from deuterium exchange measurements; excited-state proton transfer can occur at the 10 and 10' positions. Solvation times in alcohol-alkane mixtures are slower than in comparable alcohols. This is interpreted as being due to the locally low alcohol concentrations associated with solvation of the nonpolar BA ground state. The role of dielectrical relaxation in these systems is also discussed.

48008 **Reinvestigation of the laser-initiated Cl_2/HBr chain reaction: absolute rate constants and the v = 2/v = 1 ratio from Cl + HBr → HCl(v) + Br.** Dolson, D.A.; Leone, S.R. (Univ. of Colorado, Boulder). *Journal of Physical Chemistry;* **91**: No. 13, 3543-3550(18 Jun 1987).

The Cl_2/HBr chain reaction is reinvestigated by using real time state-selected observations of Δv = -1 chemiluminescence from the HCl(V) products following pulsed laser photolysis of Cl_2. These state-selected observations are analyzed with a more complete kinetic treatment to obtain room temperature rate constants for the chain propagation steps and the vibrational deactivation of HCl(V = 1,2) by HBr. The chain propagation rate constants are k/sub R1/ = (1.02 +/- 0.15) x 10^{-11} and k/sub R2/ = (1.1 +/- 0.4) x 10^{-15} cm^3 $molecule^{-1}$ s^{-1}, respectively, for Cl + HBr →/sup kR1/ HCl(v) + Br and Br + Cl_2 →/sup kR2/ BrCl + Cl. Rate constants for vibrational deactivation of HCl(v=1) and HCl(v=2) by HBr are k/sub V1/ = (1.06 +/- 0.16) x 10^{-12} and k/sub V2/ = (2.09 +/- 0.50) x 10^{-12} cm^3 $molecule^{-1}$ s^{-1}. Relative intensity measurements of the HCl v = 2 → 1 and 1 → 0 vibrational fluorescence are used to obtain an HCl(v) product branching ratio, N/sub v=2//N/sub v=1/ = 0.40 +/- 0.06. The kinetic analysis indicates that broad-band observations of infrared chemiluminescence may lead to erroneous rate constant determinations because of vibrational cascade, whereas the detection of individual vibrational states leads to correct results.

48009 **Thermodynamics of two, two-dimensional phases formed by CO_2 chemisorption on MgO.** Beruto, D.; Botter, R.; Searcy, A.W. (Lawrence Berkeley Lab., CA). *Journal of Physical Chemistry;* **91**: No. 13, 3578-3581(18 Jun 1987). Contract AC03-76SF00098.

Variations in concentrations of CO_2 adsorbed on MgO with temperature at constant pressure and with pressure at constant temperature at 880 to 950 K indicate a miscibility gap. In the low coverage region the enthalpy of chemisorption is -207 +/- 2 kJ/mol of CO_2 and the entropy of adsorption is -183 +/- 10 J/(mol deg). The molar enthalpy and entropy transition from the low to high coverage phase are -9 +/- 5 kJ and -13 +/- 10 J/deg. The enthalpies and entropies of adsorption show that the CO_2 is much more strongly held as CO_3^{2-} ions on the MgO surface than in $MgCO_3$. The number of Mg^{2+} ions bound to each surface CO_3^{2-} ion on MgO at 600 to 1000 K must be higher than reported from infrared measurements of CO_2 adsorbed as CO_3^{2-} on MgO near room temperature.

48010 **Study by solid-state NMR of ^{133}Cs and ^1H of a hydrated and dehydrated cesium mordenite.** Chu, P.; Gerstein, B.C.; Numan, J.; Klier, K. (Iowa State Univ., Ames). *Journal of Physical Chemistry;* **91**: No. 13, 3588-3592(18 Jun 1987). Contract W-7405-ENG-82.

The solid-state NMR of ^{133}Cs and ^1H in Cs-exchanged mordenite has been monitored as a function of dehydration of the zeolite. In the fully hydrated mordenite, $^{133}Cs(I=7/2)$ exhibits a single line 64 ppm upfield of aqueous saturated CsCl. The anhydrous sample exhibits two major lines of intensities 3:1 with center of mass at -57 and -190 ppm, respectively, for Cs under magic-angle spinning. The major intensity is upfield of the line observed in the hydrated sample. The electric field gradient parameters for Cs of the anhydrous sample are e^2qQ = 3.1 MHz and eta = 0.65, which reduced to e^2qQ = 210 kHz and eta = 0 for the hydrated sample. Assignment for the three sites occupied by Cs in the anhydrous sample and the corresponding chemical shifts are site II, -157 ppm; site IV, -186 ppm; and site VI, -24 ppm after correction for the second-order quadrupolar shift. The static proton spectra decrease in intensity by a factor of 35 between the fully hydrated and anhydrous sample. While maintaining a roughly constant width of 6.6 kHz, the shape of the proton line changes with dehydration and exhibits an anisotropy in the anhydrous sample.

48011 Spin-polarized electron paramagnetic resonance spectra of radical pairs in micelles. Observation of electron spin-spin interactions. Closs, G.L.; Forbes, M.D.E.; Norris, J.R. Jr. (Univ. of Chicago, IL). *Journal of Physical Chemistry;* **91**: No. 13, 3592-3599(18 Jun 1987).

A model for polarized EPR spectra generated in radical pair reactions in micelles is being proposed. The model is based on electron spin-spin interactions which remain observable because of limited diffusion in micelles. The experimental observable is a doubling of hyperfine transitions, split by the magnitude of the interaction. The polarization is generated by the nonadiabatic generation of the radical pair with a triplet or singlet precursor. The time evolution of the wave function leads to a non-Boltzmann distribution of the populations among the four energy levels. The theory is tested by comparison with experiments, previously reported and repeated in this laboratory, obtained by laser flash photolysis of benzophenone in sodium dodecyl sulfate (SDS) micelles. Simulations of the shape of the spectra and their time dependence give excellent agreement with experiment. The model is further supported by experiments in micelles modified by different salt concentrations as well as different chain lengths of the micelle-forming molecules.

48012 Rotational barriers. 1. 1,2-dihaloethanes. Wiberg, K.B.; Murcko, M.A. (Yale Univ., New Haven, CT). *Journal of Physical Chemistry;* **91**: No. 13, 3616-3620(18 Jun 1987).

The rotational barrier about the C-C bond of 1,2-dichloroethane has been calculated by using several basis sets (4-31G, 6-31G*, 6-31+G*, and 6-31++G**) and including electron correlation. Corrections for zero-point energy differences, and the differences in enthalpy change from 0 to 298 K, were made by using the calculated geometries and vibrational frequencies. The trans/gauche energy difference was found to be 1.39 kcal/mol as compared to the observed value, 1.1 +/- 0.1 kcal/mol. The intramolecular interactions in the several rotamers are discussed. The trans/gauche energy difference for 1,2-difluoroethane also was calculated (MP3/6-311++G**) and was found to be 0.76 kcal/mol favoring the gauche conformer, again in good agreement with the experimental value of 0.57 +/- 0.09 kcal/mol. The trend in trans/gauche energy differences in the series n-butane, 1,2-dichloroethane, 1,2-difluoroethane is noted.

48013 Theoretical thermochemistry. 3. A modified procedure for ionization energies of AH/sub n/ species. Pople, J.A.; Curtiss, L.A. (Carnegie-Mellon Univ., Pittsburgh, PA). *Journal of Physical Chemistry;* **91**: No. 13, 3637-3639(18 Jun 1987). Contract W-31-109-ENG-38.

The ab initio theory of AH/sub n/$^+$ monocations (A = C to F and Si to Cl), presented in part 2, is modified to give singlet-triplet separations in a manner consistent with the treatment of neutral species given earlier. New theoretical ionization energies are generally within 0.1 eV of experimental values when the latter are definitive.

48014 Structural-electronic relationships in inorganic solids: powder neutron diffraction studies of the rutile and anatase polymorphs of titanium dioxide at 15 and 295 K. Burdett, J.K.; Hughbanks, T.; Miller, G.J.; Richardson, J.W. Jr.; Smith, J.V. (Univ. of Chicago, IL). *Journal of the American Chemical Society;* **109**: No. 12, 3639-3646(10 Jun 1987). Contract W-31-109-ENG-38.

Rietveld analysis of time-of-flight pulsed neutron diffraction of powders shows a nearly isotropic shrinkage of the structures of both the rutile and anatase polymorphs of TiO_2 upon cooling from 295 to 15 K and no change in the sense of the distortion of the TiO_6 octahedra (two long and four short Ti-O distances in both): rutile at 295 (first) and 15 K (second), a_o 4.593 08 (4), 4.586 66 (4), c_o, 2.958 89 (3), 2.954 07 (3), x/sub oxygen/, 0.304 76 (6), 0.304 69 (6), Ti-O(4x), 1.9486 (3), 1.9459 (3), Ti-O(2X), 1.9796 (4), 1.9764 (4); anatase at 295 and 15 K, a_o, 3.784 79 (3), c_o, 9.502 26 (12), 0.504 65 (12), x/sub oxygen/, 0.16686 (5), 0.166 75 (4), Ti-O(4x), 1.9338 (1), 1.9322 (1), Ti-O(2X), 1.9799 (5), 1.9788 (4): all distances (A) referenced to silicon (a = 5.430 88 A). Both tight-binding calculations on the crystalline solids and molecular mechanics computations on the oxide lattice alone lead to a model in which the balance of attractive Ti-O and repulsive O-O interactions control the details of the overall structures. The relative bond lengths around metal centers in some other systems are predicted.

48015 Interaction between copper(II)-arginine complexes and HO_2/O_2^- radicals, a pulse radiolysis study. Cabelli, D.E.; Bielski, B.H.J.; Holcman, J. (Brookhaven National Lab., Upton, NY). *Journal of the American Chemical Society;* **109**: No. 12, 3665-3669(10 Jun 1987). Contract AC02-76CH00016.

Superoxide radicals were shown to react with all four Cu(II)-arginine complexes that exist between pH 1.5 and 12.5; $k_{10}(O_2^- + CuArgH^{2+}) = 3.3 \times 10^9\ M^{-1}\ s^{-1}$, $k_{12}(O_2^- + Cu(ArgH)_2^{2+}) = 1.3 \times 10^7\ M^{-1}\ s^{-1}$, $k_{13}(O_2^- + CuArg_2H^+) = 1 \times 10^6\ M^{-1}\ s^{-1}$, $k_{14}(O_2^- + CuArg^+) = 1 \times 10^8\ M^{-1}\ s^{-1}$. The system was studied in detail at pH 2.0 and pH ≧7. At low pH the mechanism was shown to proceed via a CuO_2H^{2+} complex while at higher pH a superoxide complex of the Cu(II)-arginine complexes was formed. The results are discussed in terms of the currently accepted mechanism by which SOD-Cu^{2+} dismutates O_2^- radicals.

48016 Geoporphyrin structure determination using MS/MS. Van Berkel, G.J.; Glish, G.L.; McLuckey, S.A. (Oak Ridge National Lab., TN). pp vp of 194th ACS National Meeting. Washington, DC; American Chemical Society (1987). (CONF-870802—). Contract AC05-84OR21400.

From 194. American Chemical Society national meeting; New Orleans, LA, USA (30 Aug 1987).

Absolute structure determination of geoporphyrins has been done predominantly by NMR. However, it has been shown that certain types of chemical ionization mass spectrometry (e.g., NH_3 CIMS) provide not only molecular ion information but also structurally significant fragment ions. Most important of these fragment ions are the mono-, di-, and tripyrroles. These fragments allow the pyrrole sequence of the porphyrin macrocycle to be determined. However, no information on the alkyl substituent pattern of the individual pyrroles is provided; therefore, individual porphyrin isomers cannot be distinguished. In this paper, CI/MS/MS is used to obtain structural information on individual mono-, di-, and tripyrroles formed in a chemical ionization source. In particular, emphasis will be placed on the ability to differentiate isomers by this method. High energy collision activated dissociation on a BE geometry instrument is used to obtain MS/MS spectra. An advantage of using high energy CAD is that typically higher energy fragmentation pathways can be accessed. These higher energy fragmentations give the most useful structural information.

48017 Measured 1 to 40 keV photoabsorption cross sections for: Fe, Ni, Sn, Ta, Pt, Au, Pb, U. Del Grande, N.K. (Univ. of California, Lawrence Livermore National Lab., P.O. Box 808, Mail Stop L-45, Livermore, CA 94550). pp 2-10 of X-ray imaging II. Knight, L.V.; Bowen, D.K. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-860880—).

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

Total absolute photoabsorption cross sections were measured at 1 keV to 40 kev for Fe, Ni, Sn, Ta, Pt, Au, Pb and U. Overall measurement uncertainties were 3%, less than 2% of which were statistical. The measurements tested widely-used theoretical and experimental tables. They favored relativistic Hartree-Slater atomic calculations. Agreement with theory was typically 5% or better, except near the absorption edge energy region with EXAFS peaks. The measured peak and valley magnitudes for the solid samples ranged from 0% to 20% (with an average of 10%) above the atomic calculations for Fe and Ni. Discrepancies with experimental tables, at energies below 6 keV, were 10% to 40%. Authors of widely-used tables have been fraught with problems where there were few or no prior measurements, only interpolations and theory. The present measurements used samples from a few hundred to a few thousand μg/cm/sup 2/, such that the mean free path thicknesses, μrhox, were 1 and 3 at 1.5 kev. Samples were vapor-deposited on, and floated off of, optically flat glass slides. Their weights per unit area, rhox g/cm/sup 2/, were determined within 2% or 3%. Thicker samples, of known weights per unit area, were used for the higher energy measurements. The ratio of μrhox for thick and thin samples tested rhox for the thin samples. Back-scattered protons and alpha particles, as well as ion microanalyses, were used to test the samples' purity. Uranium deposits were sandwiched between two beryllium layers to impede surface oxidation. The trans-

mission measurements were taken with a demountable x-ray tube, vacuum crystal monochromator and flow proportional counter, using slits that provided a narrow-beam geometry.

48018 **Metal reflectors in the EUV.** Scott, M.L.; Arendt, P.N.; Cameron, B.; Cordi, R.; Newnam, B.; Windt, D.; Cash, W. (Los Alamos National Lab., P.O. Box 1663, Los Alamos, NM 87545). pp 20-27 of X-ray imaging II. Knight, L.V.; Bowen, D.K. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-860880—).

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

High reflectance mirrors are difficult to achieve in the extreme ultraviolet (EUV) and it is found that one of the principle reasons is the presence of contamination layers on the surface of these reflectors. A study of these contamination layers that form even in an ultra-high vacuum (UHV) system has begun. The initial study consists of monitoring the growth of these contamination layers on various metal surfaces utilizing Auger electron spectroscopy (AES). A principal conclusion from this work is that the rate of growth of oxide and carbon contamination layers on Al, Si, and Rh is greatly enhanced if the ion gauges and Auger filaments are operating. Reflectance measurements on Rh at 11.3 nm also indicate the presence of significant carbon contamination on samples exposed to air. In addition, the authors find that oxide growth on Ag is negligible and carbon contamination is minimal.

4004 Electrochemistry

REFER ALSO TO CITATION(S) 47318, 47827, 47890, 47944

48019 (DOE/ET/26829—1, pp 50C-52C) **Electrochemical and spectroscopic characterization of the solid/liquid interface.** Frank, D.G. (Univ. of Cincinnati, OH). 20 Mar 1987. NTIS, PC A 02. File Number DE87013076.

In [Electrochemistry graduate fellowships: Final report].

The objective of their research is to understand electrode surface interactions with solvated molecular species and to characterize the resulting interface. Future practical progress in many areas of technology such as batteries, fuel cells, semiconductors, catalysts, metal corrosion protection, and composite materials development will depend greatly on fundamental scientific understanding of solid/liquid interfacial interactions. In recent years, they have shown that the surface properties of many adsorbed species can be manipulated by controlling such variables as pH, concentration, electrode potential, metal surface crystallographic orientation, surface roughness, and others (1). These variables can control adsorbate composition, orientation, mode of attachment, and structure. They have observed that these adsorbate parameters determine the composition of the double layer, the electrochemical products in a reaction, the degree of stability of an oxide film, and the amount of order in an electrodeposited layer (2). In this report, the experimental techniques used are discussed briefly, and a recent study of oxide films formed on the (100) crystallographic plane of an Fe-Cr-Ni alloy with a composition similar to that of Type 304 stainless steel is summarized.

48020 (DOE/ET/26829—1, pp 52C-55C) **Electrochemical precipitation of nickel hydroxide.** Ho, K. (Univ. of Rochester, NY). 20 Mar 1987. NTIS, PC A 02. File Number DE87013076.

In [Electrochemistry graduate fellowships: Final report].

Electrochemical precipitation of nickel hydroxide in porous nickel plaque is a relatively new method of preparing nickel hydroxide electrodes presently being used in nickel-cadmium, nickel-zinc, and nickel-hydrogen batteries. Despite the fact that there are several advantages of this method over the conventional chemical impregnation method, the conditions of the process have been experimentally determined so far through trial and error procedures. There is a need to apply the principles of electrochemical engineering in order to establish the conditions which would lead to a process competitive from both economics and quality considerations. The electrochemical precipitation of nickel hydroxide is investigated in the present work both theoretically and experimentally, and a semiempirical model is developed to predict the loading characteristics of the nickel hydroxide electrode.

48021 (DOE/ET/26829—1, pp 55C-57C) **Low power, low cost, high frequency galvanostat and application to Li/I_2 (P2VP) batteries.** Kelly, R.G. (Johns Hopkins Univ., Baltimore, MD). 20 Mar 1987. NTIS, PC A 02. File Number DE87013076.

In [Electrochemistry graduate fellowships: Final report].

A low cost, low power, high frequency galvanostat has been constructed and applied to discharging Li/I_2 batteries. The galvanostat, based upon a design for a voltage-controlled current source in a popular electronics text, has a bandwidth of 1 MHz throughout which it does not significantly distort the shape of the sinusoidal input. While 1 MHz is not sufficient in all cases for a complete impedance spectrum to be generated, this work does provide an economical extension of present capabilities.

48022 (DOE/ET/26829—1, pp 57C-59C) **Digital simulation of linear sweep voltammetry of quasi-reversible systems at ultramicroelectrodes.** Kwak, J. (Univ. of Texas, Austin). 20 Mar 1987. NTIS, PC A 02. File Number DE87013076.

In [Electrochemistry graduate fellowships: Final report].

The authors are developing a digital simulation algorithm for the migration-diffusion process at spherical electrodes. As a first stage, the algorithm has been checked with simpler electrochemical systems. Typical results for linear sweep and cyclic voltammetry of quasi-reversible systems at spherical electrodes in the absence of migration effects will be presented. The theoretical treatment of this case has not been presented previously. For example, Nicholson and Shain do not provide the spherical correction for quasi-reversible systems as they did for other systems. They note that the spherical electrode geometry (one-dimensional space problem) is a good approximation to the microdisk electrode geometry (two-dimensional space problem) as discussed later. A number of methods to solve the continuum mechanics diffusion process model represented by partial differential equations are available. For simplicity, the explicit finite-difference method was selected to simulate the diffusion process at spherical electrodes. A general procedure for this method has been described by Feldberg. In this method, space and time can be divided into arbitrary or nonuniform grids. In this work, the algorithm based on an exponentially expanding space grid for spherical geometry and a linear time grid was used for rapid computation. In the application of this simulation to ultramicroelectrode theory, one more parameter, which depends on the size of the electrode, must be added to the parameters for a planar electrode.

48023 (DOE/ET/26829—1, pp 59C-60C) **Electrocatalytic oxygen transfer reactions at PbO_2 and modified PbO_2 electrodes.** Yeo, I. (Iowa State Univ., Ames). 20 Mar 1987. NTIS, PC A 02. File Number DE87013076.

In [Electrochemistry graduate fellowships: Final report].

Lead dioxide applied as an anode material for electroanalysis and electrosynthesis has the desirable qualities of high electronic conductivity and a large positive working range due to the large activation overpotential for the evolution of oxygen by decomposition of water. It also has been shown that PbO_2 anodes have significantly greater electrocatalytic activity than other common anode materials (i.e. Pt, Au, and C) for supporting anodic processes in which oxygen is transferred from H_2O to the oxidation product. This research was motivated by the goal of increasing the electrocatalytic reactivity of electrodeposited lead dioxide for anodic oxygen transfer reactions. The determination of electrocatalytic activity for PbO_2 electrodes, as a result of the presence of other metal oxides, and the establishment of a possible mechanism of oxygen transfer catalysis at these electrodes were the principal goals of this research.

4005 Photochemistry

REFER ALSO TO CITATION(S) 47255, 47256, 47974, 47985, 48008, 48090, 49020

48024 (DOE/ER/60420—1, pp 635-645) **Pulsed laser optogalvanic spectroscopy of nitrogen in a radiofrequency discharge.** Kumar, D.; Klasinc, L.; Clancy, P.L.; Nauman, R.V.; McGlynn, S.P. (Louisiana State Univ., Baton Rouge). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Pulsed laser optogalvanic spectra of a 32 MHz radiofrequency discharge (RFLOG) in flowing, low pressure (~ 1 Torr) nitrogen are reported. The region of excitation was 16,300-17,300 cm^{-1}. The observed features correspond mainly to B³II/sub g/ withdraws A³Σ/sub u/⁺ transitions ($\Delta v = 4$). These are well known in emission and constitute the First Positive System that is of high intensity in almost all discharges in pure N_2. A comparison of the emission, absorption, and RFLOG spectra provides an interpretation of missing and/or additional, unassigned lines that occur in the various spectra. The results indicate that RFLOG spectroscopy, as presented here, is a powerful alternative to the absorption spectroscopy of low pressure gases.

48025 (DOE/ER/60420—1, pp 647-655) **Multiphoton processes in a solid in a doubly rotating system by NMR.** Manmoto, Y.; Satoh, M. (Okayama Univ. of Science, Japan). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The transition probability of multiphoton processes strongly depends on the angle between the directions of the spin quantization and the magnetic field to induce the transitions. The rotary saturation method in NMR is an excellent one to observe the multiphoton processes in solids. In this paper, the experimental observation of the multiphoton transitions between the nuclear spin Zeeman levels of F nuclei in a CaF_2 single crystal by the rotary saturation method is reported. Results are discussed by using a second quantization formalism and the nth order time-dependent perturbation theory in the doubly rotating frame.

48026 IR diode laser study of vibrational energy distribution in CO_2 produced by UV excimer laser photofragmentation of pyruvic acid. O'Neill, J.A.; Kreutz, T.G.; Flynn, G.W. (Department of Chemistry and Columbia Radiation Laboratory, Columbia University, New York, New York 10027). *Journal of Chemical Physics;* **87**: No. 8, 4598-4605(15 Oct 1987).

Time domain absorption spectroscopy using a tunable, infrared diode laser has been used to monitor the vibrational excitation of CO_2 produced in the 193 nm excimer laser photolysis of gas phase pyruvic acid ($CH_3COCOOH$). Nascent vibrational populations were measured in the following ten vibrational states of CO_2: 00^00, 01^10, 02^30, 03^30, 04^40, 00^01, 00^02, 00^03, 01^11, and 02^21. Approximately 97% of the CO_2 photoproduct is observed to be directly formed in the vibrational ground state. The remaining molecules are formed with a significant degree of vibrational excitation, having mode temperatures $T(\nu_2) = 1800 +- 150$ K, $T(\nu_3) = 3700 +- 1000$ K, $T(\nu_2+\nu_3) = 2000 +- 400$ K. The present experimental data suggest that the 193 nm photolysis may proceed through more than a single dissociation channel and involve a number of different photofragments.

48027 Spectroscopic and thermodynamic investigations of transition-metal cluster ions in the gas phase; photodissociation of MFe^+. Hettich, R.L.; Freiser, B.S. (Purdue Univ., West Lafayette, IN). *Journal of the American Chemical Society;* **109**: No. 12, 3537-3542(10 Jun 1987). Contract AC02-80ER10689.

Heteronuclear metal dimer ions, MFe^+ (M + Sc, Ti, V, Cr, Fe, Co, Ni, Cu, Nb, Ta), were generated and isolated in the gas phase with use of Fourier transform mass spectrometry. Observations of these ionic species in a ligand-free environment provides a method of probing the fundamental bonding nature between two bare transition-metal atoms. The photodissociation spectra of MFe^+, obtained by monitoring the fragmentation of MFe^+ as a function of wavelength, provide both spectroscopic and thermodynamic information. Both M^+ and Fe^+ are observed as photoproducts, with the metal having the lowest ionization potential predominating. The photodissociation spectra reveal broad absorption in the ultraviolet and visible spectral regions with a range of cross sections from 0.06 A for VFe^+ to 0.62 A^2 for $CrFe^+$. Bond energies obtained by observing photoappearance onsets are in the range of 48 kcal/mol for $ScFe^+$ to 75 kcal/mol for VFe^+ and show good agreement with values obtained by ion-molecule bracketing techniques, suggesting that the observed thresholds are thermodynamic and not spectroscopic. The metal cluster ions are found in general to be bound more strongly than their neutral metal dimer counterparts. The ionization potentials for MFe can be calculated from D^0 (M-Fe) and $D^0(M^+\text{-Fe})$ and are found to be in the range of 5.4 eV for VFe to 7.4 eV for TaFe.

48028 Determination of carbide, carbyne, and carbene bond energies by gas-phase photodissociation of $RhCH_2i$, $NbCH_2^+$, and $LaCH_2^+$. Hettich, R.L.; Freiser, B.S. (Purdue Univ., West Lafayette, IN). *Journal of the American Chemical Society;* **109**: No. 12, 3543-3548(10 Jun 1987). Contract AC02-80ER10689.

Three photoproducts, MCH^+, MC^+, and M^+ are observed in the photodissociation of MCH_3^+ (M = Rh, Nb, and La). In contrast, the low-energy collision-induced dissociation of $RhCH_2^+$ and $NbCH_2^+$ yields MC^+ and M^+ whereas $LaCH_2^+$ produces only La^+. Each photodissociation spectrum reveals two peaks: 240 nm (σ = 0.06 A^2) and 280 nm for $RhCH_2^+$, 240 nm (σ = 0.20 A^2) and 390 nm for $NbCH_2^+$, and 260 nm (σ = 0.19 A^2) and 320 nm for $LaCH_2^+$. Photoappearance thresholds for the products yield bond energies for $M^+\text{-}CH_2$, $M^+\text{-CH}$, and $m^+\text{-C}$ for each metal ion. Ionization potentials for RhC, NbC, and LaC are calculated on the basis of D^0(M-C) and $D^0(M^+\text{-C})$. Plots of metal-ion ligand bond energies vs. bond energies for corresponding carbon analogs show linear correlation and allow bond order predictions to be made for the metal complexes.

4006 Radiation Chemistry

REFER ALSO TO CITATION(S) 47948, 48003, 48004, 48015

48029 (INIS-mf—10677) Investigations into the oxygen effect during the radiolysis of serum albumin with the help of SDS-polyacrylamide gel electrophoresis. Schilling, K.B.G. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Medizinische Fakultaet). 23 Jan 1984. 166p. (In German). NTIS (US Sales Only), PC A08/MF A01. File Number DE87752791.

In this work the radiation induced structural changes of serum albumin were researched with the help of SDS-polyacrylamide gel electrophoresis. Cow serum albumin (bSA) at a concentration of 1 mg/ml was dissolved in a solution of 10/sup -2/ M sodium phosphate buffer and in an air saturated solution with and without formiate (10/sup -1/ M) and irradiated with 200 kV X-rays up to doses of 1500 Gy in a nitrogen atmosphere. The irradiation products were separated, with and without reduction, to 7.5 and 10% polyacrylamide gel, their molecular weights measured and the quantitative decrease of the monomeric serum albumin with increasing dose estimated using staining methods. With increasing dose in an air atmosphere the amount of bSA decreases, after reduction even more so, and at least 14 different protein fragments whose molecular weights were determined result from this. In the formiate-containing solution a bSA decrease of up to 20% was observed, but only in the reduced solutions. The nitrogen atmosphere during the irradiation resulted in protein aggregate formation (2, 3 and 4 times the molecular weight of the monomeric bSA). Changes in the protein size, structure, and net charge as reasons for the electrophoretic behavior are discussed as well as the importance of the primary radicals during the radiation chemical reactions.

48030 (UJV—7832-CH, pp 17-27) **Radiation technologies in the Nuclear Research Institute.** Hron, M.; Melichar, F.; Bartonicek, B. Jan 1986. NTIS (US Sales Only), PC A03/MF A01. File Number DE87780158.

In Progress of the Institute of Nuclear Research, Rez in the field of radiochemical and irradiation technology.

The specifications are reported of the irradiation device at the Radiation Chemistry Department of UJV Rez, i.e., a well-type gamma source with /sup 60/Co and a linear high-frequency electron accelerator. Examples are given of the applications of ionizing radiation in syntheses of new organic compounds, curing of electric wire insulators and plastic cross-linking. (E.S.).

48031 **Stochastic models of diffusion-controlled ionic reactions in radiation-induced spurs. 1. High-permittivity solvents.** Clifford, P.; Green, N.J.B.; Pilling, M.J.; Pimblott, S.M. (Mathematical Institute, Oxford, England). *Journal of Physical Chemistry;* **91**: No. 16, 4417-4422(30 Jul 1987).

Alternative theories for the kinetics of diffusion-controlled reactions between ions in radiation-induced spurs are considered for solvents of high permittivity, such as water. A Monte-Carlo (MC) technique for simulating the paths of the diffusing ions and their encounters is developed and shown to provide an accurate description of the time-dependent reaction probability for the case of a single pair, by comparison with numerical solutions of the Debye-Smoluchowski equation. The MC simulations are then used to test the application of more approximate theories for the kinetics of multipair spurs. Two models are examined: (i) prescribed diffusion, which is conventionally applied in radiation chemistry, and (ii) the independent reaction times (IRT) model in which reaction times are associated independently with each ion pair. The IRT model is shown to describe the kinetics better than prescribed diffusion for a two-pair Gaussian, showing time-dependent reaction probabilities that are close to those obtained from the MS simulations. Good agreement is also found for the regular tetrahedron, where the effects of competition are maximized. The performance of both approximate models improves as the number of pairs in an initially Gaussian spur is increased and prescribed diffusion copes better with ionic reactions than it does with reactions between neutral species. Finally, a comparison between ionic and neutral spurs demonstrates that it is necessary to include charge in any model of spur kinetics involving ions, even in a high-permittivity solvent such as water.

48032 **Gamma-ray initiated decomposition of aqueous ozone solutions.** Hart, E.J.; Sehested, K.; Bjergbakke, E.; Holcman, J. (Argonne National Lab., IL; Risoe National Lab., Roskilde, Denmark). *Radiation Physics and Chemistry;* **29**: No. 5, 399-403(1987).

The free-radical initiated chain decomposition of aqueous O_3-O_2 solutions has been studied as a function of dose rate and O_3 concentration in the pH range, 2.0-7.0. At dose rates of 10 rad s^{-1} or less, extensive chain decomposition of O_3 occurs. Under these conditions impurities arising from the water, glassware, acids and buffers suppress decomposition. In the absence of impurities, the decomposition is first order in O_3 concentration in the range 50-200 μM and achieves chain lengths of 200-300. A typical decomposition curve is autocatalytic, with a low initial rate, a rapid middle rate and, as the O_3 concentration approaches zero, a slow final rate. These complex decomposition curves have been analyzed by measuring the rates at 50 and 30% of the initial O_3 concentration. The yields per 100 μM O_3 increase with increasing pH to a broad maximum at pH4.0 and thereafter decline slightly.

4007 Radiochemistry And Nuclear Chemistry

REFER ALSO TO CITATION(S) 47211, 47988, 48465, 48480, 48481, 48482, 48482, 48485, 48486

48033 **(CRN-CPR—07-85) Contribution to study of effects consecutive to alpha decay of uranium 238 in some uranium compounds and uranium ores.** Ordonez-Regil, E. (Strasbourg-1 Univ., 67 (France). Centre de Recherches Nucleaires). Jun 1985. 107p. (In French). NTIS (US Sales Only), PC A06/MF A01. File Number DE87752573.

The consequences of alpha decay of /sup 238/U in uranium compounds and in uranium bearing ores have been examined in two ways: leaching of /sup 234/Th and determination of the activity ratio of /sup 234/U and /sup 238/U. The results have been interpreted mainly in terms of the "hot" character of the nascent /sup 234/Th atoms.

48034 (INIS-mf—10956, pp 39) **Comparison of new Tc-99m-compounds with I-131 (123) renal radiopharmaceuticals.** Van Wyk, A.J.; Bekker, P.; Fourie, P.J.; Van Aswegen, A.; Loetter, M.G.; Minnaar, P.C. (Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria; University of the Orange Free State, Bloemfontein, South Africa. Dept. of Biophysics). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48035 (UJV—7832-CH, pp 1-16) **Radiopharmaceuticals in Czechoslovakia.** Hron, M.; Kronrad, L.; Svoboda, K.; Melichar, F. Jan 1986. NTIS (US Sales Only), PC A03/MF A01. File Number DE87780158.

In Progress of the Institute of Nuclear Research, Rez in the field of radiochemical and irradiation technology.

The history is briefly described of the production of radiopharmaceuticals in Czechoslovakia for nuclear medicine purposes. / sup 131/I-labelled orthoiodohippurate and rose Bengal were first produced. Currently, /sup 99m/Tc is the most frequently requested radionuclide for radiopharmaceutical labelling. The preparation of / sup 99m/Tc is described in detail, a flow chart is shown and the network of /sup 99m/Tc distribution to hospitals outlined. In addition of /sup 99m/Tc and /sup 131/I, UJV Rez produces other radionuclides for nuclear medicine, such as /sup 113m/In, /sup 67/Ga, /sup 35/S, /sup 32/P, /sup 203/Hg, /sup 85/Sr. The methods are being developed of the production of /sup 201/Tl, /sup 125/I and /sup 131/I-labelled bromosulfophthalein. (E.S.).

48036 **(UJV—7832-CH) Progress of the Institute of Nuclear Research, Rez in the field of radiochemical and irradiation technology.** (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)). Jan 1986. vp. NTIS (US Sales Only), PC A03/MF A01. File Number DE87780158.

Individual items in scope for the data base are processed separately.

48037 **(ZfK—590) Annual Report 1985. Radioisotope Department.** Muenze, R. (ed.). (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)). Jun 1986. 114p. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

This annual report covers the work carried out at the Radioisotope Department, ZfK Rossendorf, during the year 1985. It contains 12 contributions related to the development of processes for generating radioisotopes, 23 contributions related to the synthesis of radioactive compounds, and 26 contributions related to the characterization of radioactive compounds. All contributions are published in summary form only and are individually processed for the INIS database. Additionally, a list is given of publications and lectures issued between January and December 1985.

48038 (ZfK—590, pp 1-2) **Isotope production in the year 1984.** Jantsch, K. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48039 (ZfK—590, pp 5-6) **Inactive testing of the AMOR-2 facility for the fission product separation of radioactive solutions from the fission molybdenum production.** Grahnert, T.; Bernhard, G.; Boessert, W.; Hladik, O. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48040 (ZfK—590, pp 7) **Studies on the hydrolysis of the extracting solvent TBP/tetrachloro ethane and its regeneration by alkaline washing.** Richter, D.; Boessert, W. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48041 (ZfK—590, pp 8-9) **Extraction and anion exchange behavior of molybdate and pertechnetate ions.** Aungurarat, G.; Wagner, G.; Beyer, G.J. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48042 (ZfK—590, pp 9-11) **Separation of /sup 111/In from irradiated silver targets.** Schwarzbach, R.; Schomaecker, K. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48043 (ZfK—590, pp 11-16) **Studies on the stability of tellurium dioxide targets under irradiation with deuterons.** Schwarzbach, R.; Steinbach, J.; Beyer, G.J.; Guratzsch, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.
The /sup 123/I production of the Rossendorf U-120 cyclotron is based on the /sup 122/Te(d,n) /sup 123/I reaction. In order to detect losses of the valuable target material /sup 122/TeO/sub 2/ the influences of the target thickness, the target crystal structure, and the homogeneity of the deuteron beam on the stability of the target have been investigated. It was found that a beam current greater than 10 μA destroys the target even after short periods of irradiation.

48044 (ZfK—590, pp 18-19) **Studies on the isolation of pure /sup 99/Tc-pertechnetate from Tc-ligand residues.** Hoffmann, S.; Spies, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48045 (ZfK—590, pp 19-21) **Technetium complexes of substituted 1,2-bis(phosphino)-ethanes. 7. The Tc-DHMPE-complex.** Seifert, S.; Maeding, P.; Kloetzer, D. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48046 (ZfK—590, pp 22-23) **Phosphite complexes of technetium.** Kloetzer, D.; Muenze, R.; Maeding, P. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48047 (ZfK—590, pp 24) **Nitrido complexes of technetium. 3. UV/VIS spectroscopic investigation of the ligand exchange of TcNBr/sub 4//sup -/ with KSCN.** Abram, S.; Abram, U.; Spies, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48048 (ZfK—590, pp 25-26) **Technetium complexes with pH shift behavior.** Abram, S.; Abram, U.; Spies, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48049 (ZfK—590, pp 26-28) **Investigation of lipophilic pH shift agents.** Pietzsch, H.J.; Abram, S.; Syhre, R.; Spies, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48050 (ZfK—590, pp 28-29) **Hexakis(dimethylphenylphosphonit)technetium(I)-tetraphenyl borate.** Abram, U. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48051 (ZfK—590, pp 29) **Preparation and characterization of thionitrosyl complexes of technetium(I) and technetium(II).** Kaden, L.; Lorenz, B.; Kirmse, R.; Stach, J.; Abram, U. (Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung; Karl-Marx-Universitaet, Leipzig, German Democratic Republic. Sektion Chemie; Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48052 (ZfK—590, pp 30) **Complexes of technetium-99 with monothio-β-carbonyl compounds.** Spies, H.; Abram, U.; Muenze, R.; Uhlemann, E.; Ludwig, E.; Scheller, D. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Paedagogische Hochschule Karl Liebknecht, Potsdam, German Democratic Republic. Sektion Chemie/Biologie; Technische Univ., Dresden, German Democratic Republic. Sektion Chemie). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48053 (ZfK—590, pp 30-31) **Preparation and characterization of technetium with Schiff bases containing O, N, and S.** Pietzsch, H.J.; Spies, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48054 (ZfK—590, pp 31-33) **Preparation of /sup 99m/Tc-Sn-N-(2,6-diethylacetanilido)-iminodiacetate from ROTOP-EHIDA.** Berger, R.; Syhre, R. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48055 (ZfK—590, pp 33-34) **Modification of HSA microspheres with DTPA.** Beyer, R.; Noll, B. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48056 (ZfK—590, pp 34-35) **Labelling of DTPA-HSA microspheres with /sup 113m/In.** Beyer, R.; Kretzschmar, M.; Noll, B. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48057 (ZfK—590, pp 36-37) **Development of a labelling procedure for preparing [/sup 125/I]-o-iodohippurate.** Rockstroh, K.; Teich, A. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48058 (ZfK—590, pp 37-40) **Synthesis and analysis of /sup 14/C-labelled DMPE and its derivatives.** Maeding, P.; Kloetzer, D.; Muenze, R. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48059 (ZfK—590, pp 40-41) **Problems of synthesis and analysis of phosphonium compounds. 1. [/sup 14/C]alkyl- and aryl-[/sup 14/C]alkyl-triphenylphosphonium halogenides.** Guethert, I. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.
In Annual Report 1985. Radioisotope Department.

48060 (ZfK—590, pp 42-43) **Synthesis of [1-/sup 14/C]butane-2-on.** Bubner, M.; Goerner, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48061 (ZfK—590, pp 43-45) **Synthesis of [nucleus-/sup 14/C]-labelled aromatic compounds. 3. Preparation of nucleus-labelled carboxylic acids and chloro phenols by Sandmeyer's reaction.** Bubner, M. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48062 (ZfK—590, pp 46-47) **Synthesis of dl-dehydro leucine and dl-dehydro leucine hydrochloride.** Mittag, E.; Noll, S. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48063 (ZfK—590, pp 49) **Tritium-labelling of 1,8-dihydroxy-9-anthrone by catalytic exchange.** Roemer, J.; Wohlrab, W. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Martin-Luther-Universitaet Halle-Wittenberg, Halle, German Democratic Republic. Bereich Medizin). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48064 (ZfK—590, pp 49-51) **Synthesis of [2-/sup 3/H]glycerol.** Brankoff, T. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48065 (ZfK—590, pp 64-65) **Determination of in vitro properties of neutral, lipophilic technetium complexes with 1,1-dichalcogeno ligands.** Abram, S.; Abram, U.; Spies, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48066 (ZfK—590, pp 65-66) **In vitro stability of ROTOP bone kits.** Berger, R. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48067 (ZfK—590, pp 68-70) **Analytical methods for studying the labelling of HSA with /sup 99m/Tc.** Noll, B.; Beyer, R. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48068 (ZfK—590, pp 70-71) **Polarographic method for determining the contents of ascorbic acid and tin(II) chloride in the /sup 99m/Tc-MDP kit.** Hoffmann, I. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48069 (ZfK—590, pp 71-76) **Comparative studies between paperelectrophoresis (PEP), paperchromatography (PC) and thin layer chromatography (TLC) for the determination of the radiochemical purity of [/sup 131/I]NaI and [/sup 131/I]o-iodo hippuric acid.** Chakraborty, K.L.; Feige, P. (I.N.S.T. Atomic Energy Research Establishment, Dacca, Bangladesh; Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic). Jun 1986. NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

Comparative investigations were carried out with PEP (method of the CINR) and ascending PC (method of the USP) for the determination of the radiochemical purity of [/sup 131/I]NaI as well as with TLC (two different solvent systems) and descending PC (method of the Compendium Medicamentorum - pharmacopoeia of the COMECON countries - and of the USP) for the determination of the radiochemical purity of [/sup 131/I]o-iodohippuric acid.

48070 (ZfK—590, pp 76-77) **Comparative studies of FN-1 and Whatman-4 chromatographic papers for the determination of the radiochemical purity of [/sup 131/I]o-iodohippurate and [/sup 125/I]o-iodohippurate.** Schoene, G. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48071 (ZfK—590, pp 77-80) **Investigation of the quality of sterile /sup 99/Mo//sup 99m/Tc-generators of several different producers.** Feige, P.; Seiberlich, S.; Thieme, K. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48072 (ZfK—590, pp 80-82) **EPR of paramagnetic Tc complex compounds. 3. Nitrido complexes of Tc(VI).** Abram, U.; Kirmse, R.; Stach, J.; Lorenz, B. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Karl-Marx-Universitaet, Leipzig, German Democratic Republic. Sektion Chemie; Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48073 (ZfK—590, pp 84) **HPLC of radiolabelled compounds in extreme low concentration ranges.** Heise, K.H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48074 (ZfK—590, pp 88-91) **Stability constants of Fe-transferrin and Ga-transferrin complexes.** Mocker, D.; Schomaecker, K. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48075 (ZfK—590, pp 91-96) **Physico-chemical properties of lanthanoid-albumin complexes.** Schomaecker, K.; Mocker, D. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48076 (ZfK—590, pp 96-99) **Calculation of the composition of yttrium citrate solutions.** Mocker, D. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48077 (ZfK—590, pp 99-100) **Complex formation of lanthanoids with citrate ligands.** Mocker, D. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48078 (ZfK—590, pp 21-22) **Technetium complexes of substituted 1,2-bis(phosphino)-ethanes. 8. Reaction of Fe(DHMPE) with /sup 99m/TcO/sub 4//sup -/.** Berger, R.; Syhre, R.; Kloetzer, D.; Maeding, P.; Muenze, R. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48079 (ZfK—590, pp 25) **Nitrido complexes of technetium. 4. Tetrakis(isothiocyanato)-nitrido technetium(V).** Abram, U.; Spies, H.; Abram, S.; Kirmse, R.; Stach, J. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Karl-Marx-Universitaet, Leipzig, German Democratic Republic. Sektion Chemie). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48080 (ZfK—590, pp 82-83) **EPR of paramagnetic Tc complex compounds. 4. EPR investigation of (Ph/sub 4/As)[TcNCl/sub 4//TcOCl/sub 4/] monocrystals.** Abram, U.; Kirmse, R.; Stach, J. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Karl-Marx-Universitaet, Leipzig, German Democratic Republic. Sektion Chemie). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48081 (ZfK—590, pp 103-105) **SCF-X/sub α/-calculations on the $[TcOS_4]^{1-}$ cluster.** Richter, H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48082 **Osmium-191/iridium-191M radionuclide.** Knapp, F.F. Jr.; Butler, T.A.; Brihaye, C. (to Dept. of Energy, Washington, DC). US Patent 4,683,123. 28 Jul 1987. Filed date 26 Aug 1985. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

This patent describes an osmium-191/iridium-191m generator system comprising an adsorbent consisting essentially of activated carbon, the adsorbent loaded with a compound containing Os-191.

48083 **Synthesis of no-carrier-added (NCA) [18F]fluoroalkyl halides and their application in the syntheses of [^{18}F]fluoroalkyl derivatives of neurotransmitter receptor active compounds.** Shiue, C.Y.; Bai, L.Q.; Teng, R.R.; Wolf, A.P. (Brookhaven National Lab., Upton, NY). *Journal of Labelled Compounds and Radiopharmaceuticals;* **24**: No. 1, 55-64(Jan 1987).

Nucleophilic aliphatic substitution of alkyl halides, [(CH_2)sub(n)X_2 (n = 2,3; X = Br, I)], with NCA K[^{18}F]Kryptofix 2.2.2 in CH_3CN gave the corresponding NCA [^{18}F]fluoroalkyl halides in 30-40% yields. The factors which influence the yield of the latter were compared. N-Alkylation of several neurotransmitter receptor active amides and amines with this reagent gave the corresponding NCA N-[^{18}F]fluoroalkyl derivatives in 20-60% yield.

48084 **Synthesis of [^{11}C]SCH 23390 for dopamine D1 receptor studies.** DeJesus, O.T.; Moffaert, G.J.C. van; Friedman, A.M. (Chicago Univ., IL; Argonne National Lab., IL). *Applied Radiation and Isotopes;* **38**: No. 5, 345-348(1987).

The optimal conditions for the synthesis of ^{11}C-labelled SCH 23390 by radio-methylation of its desmethyl precursor, SCH 24518, with [^{11}C]iodomethane are described. Isocratic reversed phase HPLC was used for the purification of [^{11}C]SCH 23390. The specific activity range in 30 runs was 10-235 Ci/mmol and average radiochemical yield was 72% based on [^{11}C]iodomethane. Mean synthesis time was 40-60 min from the end of bombardment. Preliminary animal studies indicate that [^{11}C]SCH 23390 would be useful in visualizing D1 receptors in a living brain by positron tomography.

48085 **Application of the nucleophilic substitution reactions to the synthesis of no-carrier-added (NCA) ^{18}F-labeled radioligands.** Shiue, C.-Y.; Bai, L.-Q.; Teng, R.; Wolf, A.P. (Brookhaven National Lab., Upton, NY, USA). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1038-1039(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

There is a growing interest in the application of positron labeled radioligands to map the neuroreceptors in vivo. Recently, we reported a general synthetic strategy for the preparation of a series of NCA ^{18}F-labeled butyrophenones using the nucleophilic aromatic substitution reaction. We report here the application of nucleophilic aliphatic substitution reactions to the synthesis of [^{18}F]NMS analogs and other receptor radioligands for PET studies.

48086 **Radiolytic self-decomposition of a high specific activity positron emitting radiotracer, [^{18}F]-N-methylspiroperidol.** MacGregor, R.R.; Schlyer, D.J.; Fowler, J.S.; Wolf, A.P.; Shiue, C.-Y. (Brookhaven National Lab., Upton, NY, USA). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1048-1050(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

When high activity levels of ^{18}F-N-methyl-spiroperidol were dissolved in saline, analytical radio HPLC revealed that [^{18}F]NMS underwent significant decomposition resulting in a decrease of radiochemical purity of 10-25% during the first hour. Since [^{18}F]NMS produced in low activity runs was thermally stable even at pH extremes, radiolytic decomposition appeared to be a plausible mechanism for the observed product instability at higher radiation levels. Because of the impact of such a radiolytic decomposition on the ability to transport or even store a batch of high-specific activity radiotracers for multiple PET studies during the day, a study of this phenomenon was undertaken.

48087 **Improved synthesis of [1-^{11}C]putrescine.** Fowler, J.S.; MacGregor, R.R.; Wolf, A.P.; Tesoro, A. (Brookhaven National Lab., Upton, NY, USA). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1091-1079(Oct-Dec 1986). (CONF-8606111—). Contract AC02-76CH00016.

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

Brief note.

4008 Combustion, Pyrolysis, And High-temperature Chemistry

REFER ALSO TO CITATION(S) 47054, 47110, 47714, 48003, 48157

48088 **(N—87-24549) Decoupled direct method for sensitivity analysis in combustion kinetics. Final report.** Radhakrishnan, K. (Sverdrup Technology, Inc., Cleveland, OH (USA)). Jun 1987. 17p. (NASA-CR—179636; E—3635; NAS—1.26:179636; CONF-870677—9). NTIS, PC A02/MF A01.

From 6. IMACS international symposium on computer methods for partial differential equations; Bethlehem, PA, USA (23 Jun 1987).

An efficient, decoupled direct method for calculating the first order sensitivity coefficients of homogeneous, batch combustion kinetic rate equations is presented. In this method the ordinary differential equations for the sensitivity coefficients are solved separately from , but sequentially with, those describing the combustion chemistry. The ordinary differential equations for the thermochemical variables are solved using an efficient, implicit method (LSODE) that automatically selects the steplength and order for each solution step. The solution procedure for the sensitivity coefficients maintains accuracy and stability by using exactly the same steplengths and numerical approximations. The method computes sensitivity coefficients with respect to any combination of the initial values of the thermochemical variables and the three rate constant parameters for the chemical reactions. The method is illustrated by application to several simple problems and, where possible, comparisons are made with exact solutions and those obtained by other techniques.

48089 **(SAND—87-8502) Sandia Combustion Research Program: Annual report, 1986.** (Sandia National Labs., Livermore, CA (USA)). 1986. Contract AC04-76DR00789. 250p. NTIS, PC A11/MF A01; 1; GPO Dep. File Number DE88000170.

This report presents research results of the past year, divided thematically into some ten categories. Publications and presenta-

tions arising from this work are included in the appendix. Our highlighted accomplishment of the year is the announcement of the discovery and demonstration of the RAPRENOx process. This new mechanism for the elimination of nitrogen oxides from essentially all kinds of combustion exhausts shows promise for commercialization, and may eventually make a significant contribution to our nation's ability to control smog and acid rain. The sections of this volume describe the facility's laser and computer system, laser diagnostics of flames, combustion chemistry, reacting flows, liquid and solid propellant combustion, mathematical models of combustion, high-temperature material interfaces, studies of engine/furnace combustion, coal combustion, and the means of encouraging technology transfer. 182 refs., 170 figs., 12 tabs.

48090 **Kinetics of the reaction between methyl radicals and oxygen atoms between 294 and 900 K.** Slagle, I.R.; Sarzynski, D.; Gutman, D. (Illinois Institute of Technology, Chicago). *Journal of Physical Chemistry;* **91**: No. 16, 4375-4379(30 Jul 1987). Contract AC02-78ER14953.

The kinetics of the reaction of methyl radicals with oxygen atoms has been investigated in a heatable tubular reactor coupled to a photoionization mass spectrometer. The reactants (CH_3 and $O(^3P)$) were generated homogeneously in the reactor by the simultaneous in situ photolysis of acetone and SO_2. Initial conditions were always chosen to yield $[O]/[CH_3]_0 > 20$. The decay of CH_3 was monitored as a function of [O] to yield rate constants for the reaction $O + CH_3 \rightarrow H_2CO + H$ at five temperatures between 294 and 900 K. The rate constant was found to be independent of temperature, having a value 1.4×10^{-10} cm^3 molecule^{-1} s^{-1}, and also independent of density in the range used in this study, (3-24) x 10^{16} molecule cm^{-3}. The mechanism was verified by direct observations of H_2CO production. The new experimental method, which can be used to investigate many reactions of oxygen atoms with free radicals, is described in detail.

42 ENGINEERING

48091 **(EGG-M—37586) The microcomputer as an engineering management tool.** Goldsberry, J.A.; Hoertkorn, T.R. (EG and G Idaho, Inc., Idaho Falls (USA); USDOE Idaho Operations Office, Idaho Falls). 1987. Contract AC07-76ID01570. 9p. (CONF-870669—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014882.

From Society of Women Engineers national convention; Kansas City, MO, USA (24 Jun 1987).

Project management is a concern for engineers who need to track critical technical and financial data to accomplish tasks. Conservation personnel are currently using physical files to store project data. When data are needed, it is not always easily accessible. The manual approach is becoming increasingly difficult as the number of active projects increase. The mini-computer approach is functional but requires a large investment for hardware and software. Therefore, a microcomputer-based relational database management system (DBMS) is being implemented to improve operating efficiency and decision support for the Conservation Programs at INEL and the Conservation Technologies Division at DOE-ID. Managers and technical monitors can easily access the database to check the current status of projects. The application is designed to work in conjunction with a natural language inquiry product that allows retrieval of database information in plain English.

4202 Facilities And Equipment

REFER ALSO TO CITATION(S) 47094, 47200, 47204, 47461, 47592, 48089, 48204, 48208, 48275, 49142

48092 **(CEA-CONF—8815) State of the art in the calculation of a reference motion for design purposes. Modification of bedrock motion by superficial, young deposit.** Mohammadioun, B. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Oct 1986. 12p. (CONF-8605270—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752564.

From Franco-American workshop on practice of earthquake engineering; Paris, France (26 May 1986).

Engineering seismology is aimed, among others, at predicting a strong reference motion for the site of a given critical structure to be used in the design of said installation. A common practice, when modal analysis is performed in view of the anti-seismic design of structures, is to use, as the input motion, a set of spectra with progressive values of damping. Such a practice is discussed. Parallel to those empirical predictions, attention has been drawn on strong motion studies. Progress has been made in the theoretical simulation of seismic sources and wave propagation. Reliability of inverse problems relating to type of rocks is discussed. Attempts of solutions are recalled.

48093 **(DOE/ER/13178—T1) Fundamentals and techniques of nonimaging optics research: Final report.** Winston, R.; O'Gallagher, J. (Chicago Univ., IL (USA)). 1987. Contract FG02-84ER13178. 21p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014544.

Nonimaging Optics differs from conventional approaches in its relaxation of unnecessary constraints on energy transport imposed by the traditional methods for optimizing image formation and its use of more broadly based analytical techniques such as phase space representations of energy flow, radiative transfer analysis, thermodynamic arguments, etc. Based on these means, techniques for designing optical elements which approach and in some cases attain the maximum concentration permitted by the Second Law of Thermodynamics were developed. The most widely known of these devices are the family of Compound Parabolic Concentrators (CPC's) and their variants and the so called Flow-Line or "trumpet" concentrator derived from the geometric vector flux formalism developed under this program. Applications of these and other such "ideal" or "near-ideal" devices permits increases of typically a factor of four (though in some cases as much as an order of magnitude) in the concentration above that possible with conventional means. Present efforts can be classed into two main areas: (1) "Classical" geometrical nonimaging optics, and (2) logical extensions of nonimaging concepts to the physical optics domain.

48094 **(DOE/OR—884) US Department of Energy Nuclear Energy University program in robotics for advanced reactors: Program plan, FY 1987-1991.** Mann, R.C.; Gonzalez, R.C.; Tulenko, J.S.; Tesar, D.; Wehe, D.K. (Oak Ridge National Lab., TN (USA); Tennessee Univ., Knoxville (USA); Florida Univ., Gainesville (USA); Texas Univ., Austin (USA); Michigan Univ., Ann Arbor (USA)). Jul 1987. Contract AC05-84OR21400. 137p. NTIS, PC A07/MF A01; 1; GPO Dep. File Number DE87014967.

The US Department of Energy has provided support to four universities and the Oak Ridge National Laboratory in order to pursue research leading to the development and deployment of an advanced robotic system capable of performing tasks that are hazardous to humans, that generate significant occupational radiation exposure, and/or whose execution times can be reduced if performed by an automated system. The goal is to develop a generation of advanced robotic systems capable of performing surveillance, maintenance, and repair tasks in nuclear facilities and other hazardous environments. This goal will be achieved through a team effort among the Universities of Florida, Michigan, Tennessee, Texas, and the Oak Ridge National Laboratory, and their industrial partners, Combustion Engineering, Martin Marietta Baltimore Aerospace, Odetics, Remotec, and Telerobotics International. Each of the universities and ORNL have ongoing activities and corresponding facilities in areas of R and D related to robotics. This program is designed to take full advantage of these existing resources at the participating institutions.

48095 **(DOE/PC/90518—4) Aerated and vibrated chute feeders for particulate materials: Quarterly technical report for the period June 1, 1987 to August 31, 1987.** Jackson, R. (Princeton Univ., NJ (USA). Dept. of Chemical Engineering). 1987. Contract FG22-86PC90518. 16p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000171.

In continuation of our efforts to investigate methods for the transportation of granular materials, we have been studying the gravity-driven flow of particulates down inclined chutes influenced by aeration and vibration. We have thus far proposed fundamental-

ly-based equations of motion which model the rheological behavior of these materials, and boundary conditions for solid boundaries and free-surfaces. An experimental investigation is also in progress. Aerated chute flows are studied in an inclined chute flow apparatus, and the relationships between aeration rate, particle flow rate, particle loading, flow depth, flow velocity, and chute inclination are being measured. In this report, we present the proposed equations of motion and boundary conditions that describe the inclined chute flow. Comparison between predictions and observations for the limiting case of no aeration are discussed as well as some preliminary predictions for aerated chute flows. 8 refs., 8 figs., 1 tab.

48096 **(INIS-mf—10684) Investigations of leakage behaviour of big containers and devices.** Czeschik, H. (Bochum Univ. (Germany, F.R.). Abt. fuer Maschinenbau). Dec 1984. 228p. (In German). NTIS (US Sales Only), PC A11/MF A01. File Number DE87752783.

Extrapolation models were improved and expanded and the statements on the leaks' relationship to pressure published in the literature were discussed. They should be regarded as aids in the determination and extrapolation of leaks on reactor safety vessels. The responsible factors for this were examined. Measuring processes which can be evaluated quantitatively, such as absolute pressure, comparison container or feed methods permit one to show leak rates down to 0.5 per mille per day. Conventional leak measurement and density test processes are compared.

48097 **(INIS-SU—421) Ultralow-temperature physics. Bibliography index with abstracts.** Povstyanyj, L.V.; Pastur, L.I.; Snigireva, L.K.; Gonchar, A.A. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst. Nizkikh Temperatur). 1985. 40p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87702909.

The list of conference papers, books and articles on ultralow temperature physics and engineering, published in the international press at the end of the 70s-80s, is presented. Short annotations of these papers are given. The list of organizations carrying out investigations in the field of ultralow temperature physics (338 organizations from 32 countries) is presented. 338 refs.

48098 **(ORNL/M—358) Robotics and Intelligent Systems Program.** (Oak Ridge National Lab., TN (USA)). Jun 1987. Contract AC05-84OR21400. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014561.

This report gives brief descriptions of the projects associated with the Robotics and Intelligent Systems Program (RISP). Projects included in the report are (1) Remote Operations Demonstration Facility; (2) M-2 Servomanipulator; (3) The Advanced Servomanipulator; (4) Hostile Environment Robotic Machine Intelligence Experiment Series robots); and (5) Telerobotic Concepts. These devices have application in nuclear industry and space environments. (JDH)

48099 **(SAND—86-2875C-FP) The aerothermodynamic environment for holes in hypersonic configurations.** Bertin, J.J.; Tedeschi, W.J.; Bustamante, A.C.; Reece, E.W. (Texas Univ., Austin (USA). Dept. of Aerospace Engineering and Engineering Mechanics; Sandia National Labs., Albuquerque, NM (USA)). Aug 1987. Contract AC04-76DP00789. 34p. (CONF-870830—2-FP). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014651.

From AIAA aerodynamics flight mechanics conference; Monterey, CA, USA (17 Aug 1987).

A series of test programs have been conducted in Tunnel B of the Arnold Engineering Development Center (AEDC) in which wedges and spherically-blunted cones (with surface openings and base vents) were exposed to a Mach 8 stream. Measurements of the heat transfer and pressure form the recompression face of the external surface port were compared with the corresponding values computed using the rotational method-of-characteristics for a nonadiabatic, two-dimensional flow. The computed flow field provided reasonable estimates of the experimental measurements. Over the range of test conditions, the expansion-fan flow directly impinged on only a small fraction of the surface port recompression face and it immersed the entire recompression face. The recompression pressures and heat-transfer rates could be correlated as a function of the cavity pressure ratio.

48100 **(SAND—87-0174C) Assessment of structural integrity from forced vibration testing.** Rogers, J.D. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 5p. (CONF-8710135—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014642.

From SEM fall meeting; Savannah, GA, USA (25 Oct 1987).

A method for using forced vibration testing as a diagnostic of structural integrity is presented. An experimental study of the forced vibration response of a simple beam structure with masses attached near the ends by bolted joints is discussed. The beam was soft-supported to simulate free-free boundary conditions and was excited at its midpoint by an electrodyamic shaker. The dynamic response of the beam was characterized by the measured autospectra and frequency response functions. The effect of joint tightness on the dynamic response of the system was identified through the change in the resonant frequency and the change in the frequency response function at resonance.

48101 (UCRL—53700-86, pp 5.1-5.19) **Computer technologies.** Jun 1987. NTIS, PC A10/MF A01. File Number DE87014616.

In Electronics engineering thrust area report, FY 86.

This section discusses the development of a computerized design system for complex control systems. Computer graphics are developed. A systolic array-multiprocessor is built and tested. (JDH)

48102 (UCRL—53700-86, pp 6.1-6.10) **Dynamic systems and control.** Jun 1987. NTIS, PC A10/MF A01. File Number DE87014616.

In Electronics engineering thrust area report, FY 86.

This section treats problem-solving methodology and computer-aided design of a dynamic control system. (JDH)

48103 **(Y/DX—699) Simplifying control system modeling using data scanning techniques.** Couture, S.A. (Oak Ridge Y-12 Plant, TN (USA)). 29 Jan 1986. Contract AC05-84OS21400. 17p. (CONF-861211—28). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014050.

From American Society of Mechanical Engineers winter meeting; Anaheim, CA, USA (7 Dec 1986).

Novel data scanning techniques have been used to streamline several stages in the development of analytical models from experimetal frequency response fast Fourier transform (FFT) data. In particular, a program has been developed which uses data scanning and a knowledge of basic frequency-response data patterns to perform data conditioning and consistency checks, to generate a model form describing all the major features in the data, and to estimate starting parameters for a least-squares parameter search. The data conditioning algorithm converts the phase information to a form more amenable to scanning, performs compensations for noisy data, checks measured frequency-response data for errors between magnitude and phase data which might impede the ability of the least-squares algorithm to converge on the correct solution. The model prediction algorithm scans the data for resonances and anti-resonances and places real or complex poles and zeroes in the model to describe changes in the phase data. Initial estimates of natural frequencies provided by the program are typically within 5 percent of the least-squares values. These techniques have proven effective in reducing both the amount of user-intervention and experience required for the development of the model form, and the amount of computing time required during least-squares parameter estimation. 2 refs., 7 figs.

48104 **Design studies of distributed ion pumps.** Chou, T.S. (National Synchrotron Light Source, Brookhaven National Laboratory, Upton, New York 11973). *Journal of Vacuum Science and Technology, A: Vacuum, Surfaces, and Films;* 5: No. 6, 3446-3452(Nov 1987). Contract AC02-76CH00016.

To upgrade the existing vacuum system, a new type of diode distributed ion pump (DIP) has been tested and developed for the National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory. The new pumps consist of two titanium cathodes as before, but have five parallel 304 stainless-steel plates with 16-mm-

diam holes to replace the 11-mm-diam cylinders of the old "egg crate" anode structure. They have pumping speeds for nitrogen of several tens of liters per seconds per meter at 10^{-9} Torr as is required by the NSLS for good lifetime operation. We first survey previous work on DIP and then present the results of our study on new pumps with different cell sizes and two different anode materials (aluminum and stainless steel). The pumping characteristics of the new pumps are much superior to the old types with respect to ultimate pressure and easier conditioning.

48105 **Nonlinear effects of noise on parametric amplification: An analysis of noise rise in Josephson junctions and other systems.** Bryant, P.; Wiesenfeld, K.; McNamara, B. (Physics Department, University of California, Berkeley, California 94720; Materials and Chemical Sciences Division, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Journal of Applied Physics;* 62: No. 7, 2898-2913(1 Oct 1987). Contract AC03-76SF00098;AC02-76CH00016.

We take a new look at an old problem; namely, the observed "noise rise" in superconducting Josephson junction parametric amplifiers. By exploiting recent insights from dynamical systems theory, we show how the interplay or random noise and (nonchaotic) deterministic dynamics can result in a noise rise like that observed in experiments. Our analysis leads to a universal first-order equation which applies to all similar systems in the high-gain regime. We propose several predictions which can be tested experimentally, including that a similar noise rise should occur in modulated semiconductor injection lasers. We also analyze a previously unknown mode of operation: a "six-photon" mode associated with a symmetry breaking bifurcation: and discuss its potential advantages over the previously studied three- and four-photon modes.

48106 **Electrothermal-electromagnetic hybrid thruster research.** Kelly, A.J.; Jahn, R.G.; Myers, R. (Princeton Univ., NJ). *AIAA Paper;* 7(May 1987). (AIAA-Paper—8-1018; CONF-870558—).

From 19. international electric propulsion conference; Colorado Springs, CO, USA (11 May 1987).

The energy deposition and acceleration mechanisms in the electrothermal-electromagnetic hybrid regime of coaxial plasma thruster operation are examined both theoretically and experimentally. Theoretical results show that the major trade-offs in the hybrid regime are between efficiency and specific impulse: increasing the influence of electromagnetic forces increases I(sp), but within the operating range examined, decreases the efficiency. Experiments conducted in the predominantly electromagnetic regime agree with the predictions. Anode power deposition is the dominant loss process. 26 references.

48107 **MPD thruster plasma instability studies.** Kelly, A.J.; Jahn, R.G.; Choueiri, E.Y. (Princeton Univ., NJ). *AIAA Paper;* 12(May 1987). (AIAA-Paper—8-1067; CONF-870558—).

From 19. international electric propulsion conference; Colorado Springs, CO, USA (11 May 1987).

Results of an ongoing experimental/theoretical effort to understand the influence of plasma waves and instabilities upon coaxial plasma thruster performance and longevity are discussed. An experiment which permits measurement of the plasma dispersion relation plus a suite of plasma parameters for each one millisecond quasi-steady discharge is described. This investigation is guided by a linearized Boltzmann-Poisson kinetic numerical model which can accommodate the effects of collisions, inhomogeneities and the magnetic field. Preliminary tests reveal the presence of the low-frequency branch of an ion cyclotron wave. Although the stability of these waves still has to be established through spatial growth rate measurements, it is well known that they are prone to current-driven instabilities. Current-driven instabilities in the collisional tensor conducting plasma of the MPD thruster are analytically discussed and their relevance to the MPD plasma is illustrated by estimating a critical total current at which their onset occurs. 5 references.

48108 **Macroscopic quantum effects in the zero voltage state of the current biased Josephson junction.** Clarke, J.; Devoret, M.H.; Martinis, J.; Esteve, D. (Dept. of Physics, Univ. of California and Materials and Molecular Research Div., Lawrence Berkeley Lab., Berkeley, CA 94720). pp 1-17 of Josephson effect: Achievements and trends. Barone, A. Teaneck, NJ; World Scientific Pub. Co. (1986). Contract AC03-76SF00098.

Leggett has stimulated interest in the question of whether quantum mechanics applies to macroscopic variables, an issue that is addressed experimentally only recently. An attractive candidate for investigating this question is the Josephson tunnel junction, a system in which thermal fluctuations and perturbation due to the environment are made relatively unimportant. In the case of the current-biased junction, the macroscopic variable is the phase difference δ between the superconducting order parameters on either side of the barrier. For a model junction in which the complex impedance shunting the junction consists of a capacitance C and resistance R in parallel, the equation of motion for the junction is given.

4203 Lasers

48109 **(AD-A—182076/0/XAB) Diode lasers with cylindrical mirror facets and reduced beam divergence.** Walpole, J.N.; Liau, Z.L.; Missaggia, L.J.; Yap, D. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). 4 May 1987. 4p (JA—5928). NTIS, PC A02/MF A01.

P . in Applied Physics Letters, Vol. 50, No. 18, 1219-1221(4 M. y 1987).

Chemical etching and mass transport have monolithically integrated cylindrical lenses at one of the ends of buried heterostructure GaInAsP/Inp diode laser cavities. The lenses are designed to provide reflective feedback for low-threshold current (as low as 25 mA), as well as reduction of beam width in the lateral direction (as small as 9.2).

48110 **(AD-A—182153/7/XAB) Free electron laser sideband instability reconsidered.** Riyopoulos, S.; Tang, C.M. (Naval Research Lab., Washington, DC (USA)). 1986. 21p. NTIS, PC A02/MF A01.

The one-dimensional fast-time-averaged Hamiltonian is derived in a free-electron laser (FEL) for electrons passing through a constant wiggler and a radiation field. The exact unperturbed orbits without sidebands are obtained for all particles and arbitrary separatrix width delta sub gamma. Integration in action-angle variables of the linearized Vlasov equation with perturbing sidebands over the unperturbed orbits yields the sideband gain for both trapped and untrapped particles. The unperturbed distribution $f_0$is in an adiabatic equilibrium with the main signal field. It is found that upper and lower sidebands that are symmetric relative to the FEL frequency have opposite growth rates. There is no differentiation in the magnitude of the gain between upper and lower sidebands. The stability is determined by the sign of df_0/d omega sub b, i.e., the relative population of oscillation quanta h-bar omega sub b, omega sub b = bounce frequency around resonance. The shear d omega sub b/dJ, where J is the action variable, is stabilizing and distributions with gradients df_0/dJ localized near the separatrix have the minimum growth rates. The structures and scaling of the unstable spectrum are different from previous results obtained for electrons localized at the bottom of the ponderomotive well.

48111 **(AD-A—182400/2/XAB) Frequency stabilization and phase locking of laser diodes and laser arrays (FG 87). Progress report.** Goldberg, L. (Naval Research Lab., Washington, DC (USA). Optical Sciences Div.). 1986. 10p. NTIS, PC A02/MF A01.

The major accomplishments for FY 86 were: 1. Demonstration of efficient coupling of an injection-locked laser-array single-lobe output into a single-mode optical fiber. A coupling efficiency of 30% was achieved for a 40-element array emitting 500 mW, corresponding to a fiber output power of 150 mW. 2. Demonstration of a novel external ring-laser cavity operation of a gain-guided array. The ring cavity relies on self-injection locking of the array by its own spatially filtered output. As in the case of injection lock-

ing, the ring-laser external cavity results in single diffraction-limited-lobe far-field emission of the array, but with the added advantage of eliminating the need for a separate master laser and the associated wavelength and temperature requirements.

48112 (AD-A—182403/6/XAB) Advanced laser-source research. Technical report (Final), 1 April 1978-31 March 1987. Schawlow, A.L.; Hansch, T.W.; Harris, S.E. (Stanford Univ., CA (USA). Dept. of Physics). 1 Jun 1987. 21p. NTIS, PC A02/MF A01.

Nonlinear Spectroscopy: The approach was to study molecular systems that exhibit unusual spectroscopic behavior, in the hope that they may lead to novel techniques for upconverting laser frequencies. Also studied are novel methods of laser spectroscopy and wavelength stabilization. Tunable Laser and Coherent Light Techniques for High-Resolution Ultraviolet Spectroscopy - 10 papers produced. The overall theme of this contract has been on studies of the physics and technology of extreme ultraviolet (XUV) and soft x-ray lasers and devices. Much of the work has centered on methods for the production of core-excited metastable atoms and ions; and on the use of these atoms and ions both for new types of spectroscopy and for new types of XUV Lasers. An extensive study is made of the scattering of N_2 off the flat, close-packed Ag(111) surface. Not only is the rotational population of the scattered N_2, but also the alignment as described by the quadrople and hexadecapole moments of the J distribution, denoted by A(2) /sub 0/ and A(4) /sub 0/, respectively.

48113 (AD-A—182525/6/XAB) New concept for scaling excimer-laser amplifiers. Technical report (Final), 1 October 1985-30 April 1987. Watterson, R. (Science Research Lab., Inc., Somerville, MA (USA)). 30 Jun 1987. 48p. (SRL—04-F-1987). NTIS, PC A03/MF A01.

A novel concept for efficient volumetric scaling of excimer lasers to high average power and energy was theoretically and experimentally investigated. Numerical calculations of the extraction efficiency of an excimer-laser amplifier with a nonsaturable distributed loss are described. These results show that expanding the beam as it traverses the amplifier can lead to considerably improved extraction efficiency. Expansion angles of 2 to 5 degrees are useful for large-scale laser amplifiers (10 meters in length). A small-scale proof-of-principle experiment was constructed. This consisted of an electron-beam-pumped XeCl master oscillator-amplifier system. A 250-kV electron beam pumped a 11 cm x 11 cm x 100 cm active volume which served as both a oscillator and as an amplifier. Meassurements of the extraction efficiency were peformed for collimated, cyclindrically expandning, and spherically expanding beams. An expansion angle of approximately 0.6 degrees led to an improvement of as much as a factor of 2-in. integrated extraction efficiency.

48114 (AD-A—182532/2/XAB) Proof of the feasibility of coherent and incoherent schemes for pumping a gamma-ray laser. Annual progress report, 30 September 1986-31 May 1987. Collins, C.B. (Texas Univ., Richardson (USA). Center for Quantum Electronics and Applications). Jun 1987. 82p. (UTD-GRL—8603). NTIS, PC A05/MF A01.

Recent approaches to the problem of the gamma-ray laser have focused upon upconversion techniques in which metastable nuclei are pumped with long-wavelength radiation. At the nuclear level the storage of energy can approach tera-Joules per liter for thousands of years. However, any plan to use such a resource for a gamma-ray laser poses problems of a broad interdisciplinary nature requiring the fusion of concepts taken from relatively unrelated fields of physics. This research describes several means through which this energy might be coupled to the radiation fields with cross sections for stimulated emission that could reach 10^{17} power sq cm. Such a stimulated release could lead to output powers as great as 3 x 10^{21} power Watts/liter. Since 1978, an approach has been pursued for the upconversion of longer-wavelength radiation incident upon isomeric nuclear populations that can avoid many of the difficulties encountered with traditional concepts of single-photon pumping. Recent experiments have confirmed the general feasibility and have indicated that a gamma-ray laser is feasible if the right combination of energy levels and branching ratios exists in some real material.

48115 (LA-UR—87-2882) Development of a high-energy crowbar for the Los Alamos free-electron laser. Hornkohl, J.O.; Lynch, M.T. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 13p. (CONF-8709110—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014748.

From 9. international free-electron laser conference; Williamsburg, VA, USA (14 Sep 1987).

A 135-kV, 2.5-μs crowbar has been developed to protect the TH2095A klystrons used on the Los Alamos free-electron laser. The klystron power supply consists of a 135-kV, 8.75-μF capacitor bank with a stored energy of approximately 80 kJ. The TH2095A specifications require that the dissipated energy in a klystron arc be limited to less than 10J. The crowbar design is based upon a series stack of pressurized spark gaps immersed in an oil tank. The spark gaps are triggered by an SCR-switched high-voltage trigger transformer. Input triggers are provided by current-monitoring transformers. The following currents are sensed for input triggers: total system current, integrated system current (long pulse sensing), cathode current, and modulator-anode current. Trigger levels are set to approximately 150% of nominal current levels. Unique features of this design are its modulator-anode trigger, noise immunity, and ability to print out the energy dissipated in the klystron arc. Typical operation of this system limits the energy dissipated in an arc to less than 2J. This paper describes the original design requirements, mechanical layout and fabrication, main trigger circuit design, modulator-anode trigger design, noise immunity circuit, integrated energy monitor, diagnostics, and recent developments. Performance data are also included. 1 ref., 6 figs.

48116 Mechanisms for creating population inversions in Ne-like ions. Goldstein, W.H.; Whitten, B.L.; Hazi, A.U.; Chen, M.H. (High-Temperature Physics Division, Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3607-3611(15 Oct 1987).

We investigate the effects of inner-shell ionization of sodium-like ions on the kinetics of neonlike selenium, using a simple model that separates the calculation of the excited-state kinetics from that of the ionization balance. Our model includes collisional and radiative transitions between the neonlike states, inner-shell ionization of sodiumlike states, and dielectronic recombination from fluorine-like ions. By examining the relative importance of these various population mechanisms, we demonstrate that inner-shell ionization of sodiumlike ions has a significant effect on the inversion kinetics of neonlike selenium, although it is not sufficient alone to account for the discrepancy with experimental observation.

48117 Picosecond coherence time measurement with a double slit. Cobble, J.A. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Applied Optics;* **26**: No. 19, 4048-4051(1 Oct 1987).

A double-slit diffraction experiment is described for measuring pulse coherence time, pulse widths, and maximum power of laser radiation pulses. (AIP)

48118 Soft x-ray lasing in neonlike germanium and copper plasmas. Lee, T.N.; McLean, E.A.; Elton, R.C. (Laser Plasma Branch, Plasma Physics Division, Naval Research Laboratory, Washington, DC 20375-5000). *Physical Review Letters;* **59**: No. 11, 1185-1188(14 Sep 1987).

Soft x-ray 3p→3s lasing in neonlike germanium (Ge/sup 22+/) and copper (Cu/sup 19+/) in the wavelength interval of 195 to 285 A is observed for the first time, with gain coefficients ranging from 1.7 to 4.1 cm/sup -1/, the higher gain with germanium. The lasing plasmas are produced by focusing a driving laser beam (λ = 1.05 μm, 2-ns FWHM) into an 18-mm-long line onto thin films and slab targets. The measured J = 0 to 1 gain coefficients are comparable to those of the J = 2 to 1 transitions. The measured wavelengths of the six lasing lines compared favorably with recent calculations.

48119 **Operation of Ho:YAG at intermediate temperatures.** Barnes, N.P.; Gettemy, J. (NASA Langley Research Center, Hampton, VA 23665). pp 360 of Proceedings of the conference on lasers and electro-optics. Piscataway, NJ; IEEE Service Center (1987). (CONF-870401—).

From OSA/IEEE conference on lasers and electro-optics (CLEO '87); Baltimore, MD, USA (27 Apr 1987).

While Ho:YAG has proved an efficient laser, operation has been limited in most cases to cryogenic temperatures. To avoid the problems associated with cryogenic cooling, laser operation at temperatures intermediate to cryogenic temperatures and room temperature is explored. Both the measurement of basic parameters and the engineering aspects are presented.

48120 **Solgel coatings for high-power laser application.** Thomas, I.M. (Lawrence Livermore National Lab., P.O. Box 5508, Livermore, CA 94550). pp 320-322 of Proceedings of the conference on lasers and electro-optics. Piscataway, NJ; IEEE Service Center (1987). (CONF-870401—).

From OSA/IEEE conference on lasers and electro-optics (CLEO '87); Baltimore, MD, USA (27 Apr 1987).

This paper discusses optical coatings prepared by the solgel process have been shown in many cases to have high-laser-damage thresholds in addition to excellent optical properties. Using a basic catalyst was possible to prepare a colloidal suspension of silica particles in ethanol. When this suspension was applied to substrate, a porous silica coating consisting of layers of silica particles was obtained after evaporation of the ethanol. No further treatment was required, and the porosity was such that almost 100% transmission was obtained at the relevant wavelength. The laser damage threshold of this coating on fused silica was close to that of the bare surface threshold, and on KDP the substrate damaged before the coating. The preparation of high-index oxide coatings by the solgel method was also investigated. Two methods were used: The first involved the preparation of a colloidal suspension and subsequent application to a substrate in like manner to the silica process. The second involved the application of a solution of a suitable precursor material to the substrate followed by conversion of the precursor to the relevant oxide.

48121 **High-damage-fluence laser glass for Nova.** Wallerstein, E.P.; Campbell, J.H.; Grens, J.Z.; Greiner, G.J.; Hatcher, C.W.; Kimmons, J.F.; Marion, J.E.; Milam, D.; Pitts, J.H.; Walmer, C.D. (Lawrence Livermore National Lab., P.O. Box 5508, Livermore, CA 94550). pp 322 of Proceedings of the conference on lasers and electro-optics. Piscataway, NJ; IEEE Service Center (1987). (CONF-870401—).

From OSA/IEEE conference on lasers and electro-optics (CLEO '87); Baltimore, MD, USA (27 Apr 1987).

The ten-beam Nova laser at the Lawrence Livermore National Laboratory is the world's largest and most powerful laser system. The authors describe how using oxidizing conditions combined with newly developed melting techniques, the metallic Pt contamination in phosphate laser glass has been reduced by a factor of —8000 to an average of —0.5 particle per disk. (It is important to realize that the techniques for eliminating Pt particles are dependent on the chemistry of the laser glass and that a solution for one type of glass will not necessarily work for another.) It is acceptable to have a small number of particles which do not grow beyond 250 μm in diameter under the full Nova fluence. During summer 1986, twenty nearly inclusion-free Nova disks were prepared in trial production by each vendor. On the basis of these results, full production has begun in late November. A related problem is the detection of Pt particles at an early stage of manufacture. It is nearly impossible to inspect visually large volumes of laser glass and insure that there are no microscopic Pt particles. Therefore, an automated laser scanning system to test for the presence of damaging inclusions was developed. The system uses a YAG laser to deliver high-fluence pulses to the glass disk. The pulse fluence is —2-3 times the Pt damage threshold. When present, Pt inclusions are easily directed by the characteristic fracture sites they create. The laser operates at 20 Hz and is used to scan the entire disk in —4-8h. Postshot examination of the disk for damage sites takes —1h. If the glass does not meet the Nova specification it is rejected. LLNL has provided damage test systems to both Hoya and Schott which are being used ot test all the production glass.

48122 **Observation of eigenmodes in index-guided arrays by injection seeding.** Hohimer, J.P.; Hadley, G.R.; Owyoung, A.; Goldstein, B. (Sandia National Labs., Albuquerque, NM 87185-5800). pp 314 of Proceedings of the conference on lasers and electro-optics. Piscataway, NJ; IEEE Service Center (1987). (CONF-870401—).

From OSA/IEEE conference on lasers and electro-optics (CLEO '87); Baltimore, MD, USA (27 Apr 1987).

In the past, injection seeding has proved a valuable tool for studying the behavior of gain-guided diode laser arrays. The authors applied injection seeding methods to the study of channel substrate planar (CSP) index-guided arrays in an effort to understand better the modal behavior of these devices and to provide an input to our modeling effort. In this work, they report on a study of CSP arrays with four, six, and eight channels with channel widths of 3.5 μm and channel-to-channel spacings of 4 and 7 μm. The CSP arrays with 4-μm channel spacing are very strongly coupled and show eigenmodes very similar in nature to those of gain-guided arrays. In contrast, for the case of the CSP arrays with 7-μm spacing, the coupling is very weak, and the eigenmodes are very tightly confined to the location of the channels. For these latter devices, the inphase and out-of-phase modes are found to be nearly degenerate. In addition, the intensity of the outer channels is suppressed as predicted by our model. In spite of the similarities of the closely spaced CSP arrays with gain-guided devices, they still retail many of the characteristics of index-guided devices (e.g., single-frequency operation). Also, the higher-order modes observed in gain-guided arrays are conspicuously absent in these devices. Our observation of both near- and far-field emission patterns in these CSP devices show varying degrees of similarity with gain-guided arrays as the coupling between channels in these devices is varied.

48123 **Generation of high-quality variable-duration KrF pulses by means of a phase-conjugate mirror.** Kurnit, N.A.; Thomas, S.J. (Los Alamos National Lab., Chemical and Laser Sciences Div., Los Alamos, NM 87545). pp 312-313 of Proceedings of the conference on lasers and electro-optics. Piscataway, NJ; IEEE Service Center (1987). (CONF-870401—).

From OSA/IEEE conference on lasers and electro-optics (CLEO '87); Baltimore, MD, USA (27 Apr 1987).

Phase-conjugate mirrors have previously been applied to improving the output characteristics of numerous laser systems, including KrF, and have also been used for shortening pulses either by compression or truncation. The authors describe a fairly simple modification to a commercial laser system that provides high-intensity nearly diffraction-limited KrF pulses of duration variable between 0.5 and 10 ns. The output is quite reproducible and contains a relatively low-level background of amplified spontaneous emission (ASE), most of which can be eliminated by means of a spatial filter. The high-contrast ratio between the amplified pulse and any residual prepulse energy is of interest for possible applications to inertial confinement fusion lasers which require input pulses with well-controlled prepulse energy. Some preliminary studies of damage and self-focusing thresholds using these variable-length pulses are also reported.

48124 **High power laser research and development at the Laboratory for Laser Energetics.** Soures, J.M.; Mc Crory, R.L.; Cerqua, K.A.; Craxton, R.S.; Hutchison, R. (Univ. of Rochester, Rochester, NY). pp 74-87 of Laser research and development in the Northeast. Trainor, D.W.; Chicklis, E.P. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-8609127—).

From SPIE symposium on optics and optoelectronics; Cambridge, MA, USA (14 Sep 1986).

As part of its research mission - to investigate the interaction of intense radiation with matter - the Laboratory for Laser Energetics (LLE) of the University of Rochester is developing a number of high-peak power and high-average-power laser systems. This paper highlights some of the LLE work on solid-state laser research, development and applications. Specifically discussed is the performance and operating characteristics of Omega, a twenty-four

beam, 4,000 Joule, Nd:glass laser system is frequency tripled using the polarization mismatch scheme. The authors also discuss progress in efforts to develop high-average-power solid-state laser systems with active-mirror and slab geometries and to implement liquid-crystal devices in high-power Nd;glass lasers. Finally they present results from a program to develop a compact, ultrahigh-peak-power solid-state laser using the concept of frequency chirped pulse amplification.

48125 **Laser monitors for trace species in environmental and industrial processes.** Kolb, C.E.; Wormhoudt, J.; Freedman, A.; Zahniser, M.S.; Worsnop, D.R.; Kebabian, P.; Anderson, S. (Aerodyne Research, Inc., Billerica, MA). pp 60-72 of Laser research and development in the Northeast. Trainor, D.W.; Chicklis, E.P. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-8609127—).

From SPIE symposium on optics and optoelectronics; Cambridge, MA, USA (14 Sep 1986).

Aerodyne Research, Inc., is pursuing an active research program aimed at the discovery, development of new laser based techniques for the measurement of trace molecular species and of interest in environmental and industrial processes. Laser technology exploited in these efforts include advanced lead salt tunable diode, IR HeNe, dye excimer systems. Specific examples of environmental applications include atmospheric boundary layer trace flux measurements for biogenic, photochemical and combustion produced trace species such as CH/sub 4/, N/sub 2/O, OCS, O/sub 3/, NO/sub 2/, HNO/sub 3/, and SO/sub 2/ important in stratospheric ozone layer chemistry, acid dry deposition and atmospheric greenhouse studies. Methods for probing the trace species content of natural water samples will also be discussed. Laser based monitoring systems for industrial processes include detectors for key reactive species in microcircuit fabrication techniques such as plasma etching and chemical vapor deposition and trace species monitoring in molten foundry metals and electronic chip materials.

48126 **Ultrastable carbon dioxide (CO/sub 2/) lasers.** Freed, C. (MIT, Lexington, MA). pp 36-45 of Laser research and development in the Northeast. Trainor, D.W.; Chicklis, E.P. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-8609127—).

From SPIE symposium on optics and optoelectronics; Cambridge, MA, USA (14 Sep 1986).

This paper reviews the spectral purity, frequency stability and long-term stabilization of CO/sub 2/ isotope lasers developed at MIT Lincoln Laboratory. Extremely high spectral purity and short-term stability of less than 1.5 x 10/sup -13/ have been achieved and are discussed. A long-term stabilization technique, which was used to line-center lock any regular or hot-band CO/sub 2/ isotope laser transition, is described. A brief description on using CO/sub 2/ lasers as secondary frequency standards is also given.

4204 Heat Transfer And Fluid Flow

REFER ALSO TO CITATION(S) 47349, 47703, 48099

48127 **(FEI—1798) Heat transfer in laminar flow for mass inlet into an annular channel.** Groshev, A.I.; Zubkov, P.T.; Khudasko, V.V.; Yugov, V.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702890.

The results of numerical calculations of temperature fields, pressure gradient, local Nusselt numbers in an annular clannel at constant temperature on the inner surface at different parameters of mass inlet through the external surface are described. The conclusion is made that varying the mass inlet parameter one can control hydrodynamics and the temperature field along the clannel length and across the channel. 13 refs.; 4 figs.

48128 **(N—87-23934) Computation of full-coverage film-cooled airfoil temperatures by two methods and comparison with high heat flux data.** Gladden, H.J.; Yeh, F.C.; Austin, P.J. Jr. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Jun 1987. 18p. (NASA-TM—88931; E—3372; NAS—1.15:88931; CONF-870505—6). NTIS, PC A02/MF A01.

From 32. international gas turbine conference and exhibition; Anaheim, CA, USA (31 May 1987).

Two methods were used to calculate the heat flux to full-coverage film cooled airfoils and, subsequently, the airfoil wall temperatures. The calculated wall temperatures were compared to measured temperatures obtained in the Hot Section Facility operating at real engine conditions. Gas temperatures and pressures up to 1900 K and 18 atm with a Reynolds number up to 1.9 million were investigated. Heat flux was calculated by the convective heat transfer coefficient adiabatic wall method and by the superposition method which incorporates the film injection effects in the heat transfer coefficient. The results of the comparison indicate the first method can predict the experimental data reasonably well. However, superposition overpredicted the heat flux to the airfoil without a significant modification of the turbulent Prandtl number. The results suggest that additional research is required to model the physics of full-coverage film cooling where there is significant temperature/density differences between the gas and the coolant.

48129 **(NP—7770319) Investigation of heat transfer inside a cross-flowed pebble bed at temperatures up to 1100degC.** Farber, P. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen). 29 Apr 1986. 97p. (In German). NTIS (US Sales Only), PC A05. File Number DE87770319.

Reactor design requires detailed knowledge on heat transfer mechanisms in cross-flowed pebble beds. The author describes experimental investigations of the transfer mechanisms 'conduction', 'convection', and 'radiation', with particular regard to the conditions inside the reaction zone. The experimental set-up, procedure, and evaluation are described including the fitted polynomials used for the evaluation. The balance equations applied and the calculated heat transfer coefficients are presented. Finally, the effects of the true gas temperature and of the solid-body heat radiation on the Nusselt number are investigated. (HAG).

48130 **(NP—7770320) Contribution to the representation of circumferential flow instabilities and feed disturbances in axial compressors.** Neuhoff, H.G. (Duisburg Univ. (Gesamthochschule) (Germany, F.R.). Fachoereich Maschinenbau). 17 May 1985. 163p. (In German). NTIS (US Sales Only), PC A08. File Number DE87770320.

The author intends to develop a method for determining the stability characteristics of a compressor unit or system already in the projecting stage. Circumferential flow separation and feed disturbances in axial compressors were investigated using a physical/mathematical model describing transient flow in axial compressors. Profile boundary layers are considered, the proposed method of calculation is presented, and its application is described. (HAG).

48131 **(STEV-FBT—87-16) Some aspects of the fluid dynamic behaviour of fast fluidised beds.** Brereton, C.; Stroemberg, L. (Statens Energiverk, Stockholm (Sweden); Studsvik Energiteknik AB, Nykoeping (Sweden)). Dec 1985. 20p. (STUDSVIK-EB—85-94). NTIS (US Sales Only), PC A02/MF A01. File Number DE87753109.

This paper will look at the two aspects of the fluid mechanics of circulating beds: macroscopic density profiles in small and large units; and the micro-structure of the flow. The first part of the paper reiterates the work of Stroemberg (1980, 1981) expanding upon various aspects which have not been treated previously. The second part of the paper presents some results from capacitance studies which lend some insight into bed operation at low solids loadings.

48132 **PIC numerical scheme for a two-dimensional Eulerian code.** Kwak, D.; Lee, W.H. pp 495-505 of Computational Fluid Dynamics Conference, 8th, Honolulu, HI, June 9-11, 1987, Technical Papers. New York, NY; American Institute of Aeronautics and Astronautics (1987). (AIAA-Paper—8-1147; CONF-8706104—).

From 8. American Institute of Aeronautics and Astronautics computational fluid dynamics conference; Honolulu, HI, USA (9 Jun 1987).

The present work uses the PIC method with operator splitting to hydroelastoplastic multimaterial flow problems in 2D Eulerian coordinates. The operator splitting procedures are carried out in both Lagrangian and remap phases with alternating direction for each time advancement to maintain the accuracy of one-dimensional scheme. A detail description of the numerical approximations is given with a sample calculation of a tungsten rod penetrating an aluminum target.

48133 **Annual review of numerical fluid mechanics and heat transfer. Volume 1.** Chawla, T.C. New York, NY; Hemisphere Pub. Corp. (1986). 400p. Hemisphere Publishing, 79 Madison Avenue, New York, NY 10016.

This book describes applications of numerical methods in fluid mechanics and heat transfer. Topics covered include the following: high speed gas dynamics; turbulence; multiphase flows; rheology; meteorology; tribology; oceanography; hydrology; combustion; chemical processes; metallurgy; energy conversion; power; biomedicine; noise and acoustics; nuclear and fusion engineering; low-gravity space manufacturing processes; and arctic and cryogenic heat transfer.

4205 Materials Testing

REFER ALSO TO CITATION(S) 47877, 47881, 47897

48134 **(CONF-870856—1) Needs assessment for NDT [nondestructive testing] and characterization of ceramics: Assessment of inspection technology for green state and sintered ceramics.** McClung, R.W.; Johnson, D.R. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 19p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013550.

From Conference on nondestructive testing of high performance ceramics; Boston, MA, USA (25 Aug 1987).

A needs assessment was found for nondestructive testing and materials characterization to achieve improved reliability in ceramic materials for heat engine application. Considered were raw materials, green state bodies, and sintered ceramics. This paper discusses applications of nondestructive testing to green state and sintered ceramics. Included are identification of critical characteristics that affect material properties and performance, potential examination techniques, and the results of prior studies of technique applications to ceramic materials. 59 refs.

48135 **(CONF-870856—2) NDE [nondestructive evaluation] of advanced structural ceramics.** Simpson, W.A. Jr.; McClung, R.W. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 22p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014417.

From Conference on nondestructive testing of high performance ceramics; Boston, MA, USA (25 Aug 1987).

We describe development of techniques for the evaluation of ceramics using high-frequency elastic waves to probe the region of interest. Flaws smaller than 25 μm have been detected in monolithic and composite ceramics at depths of about 3 mm in alumina, silicon carbide and silicon nitride, and about 5 mm in zirconia. Advanced procedures are described for the rapid determination of attenuation as a function of frequency for studies of microstructural variation. Both frequency dependent and independent corrections are made automatically to yield the true material attenuation. Whisker clumps in whisker-toughened ceramics were also detected and mapped, and the relatively large size of 100 to 200 μm diameter ensures that they will be detected reliably even when located relatively far from the transducer focal plane. 6 refs., 12 figs.

48136 **(DOE/DP/40200—57) Stress measurements in sol-gel films.** Cerqua, K.A.; Hayden, J.E.; LaCourse, W.C. (Rochester Univ., NY (USA). Lab. for Laser Energetics). Sep 1987. Contract FC08-85DP40200. 19p. (CONF-8707101—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014467.

From International conference of glass and glass-ceramics; Kyoto, Japan (12 Jul 1987).

Thin solid films of a wide variety of materials have received increased attention during the past decade. These films have been instrumental in the growth of numerous technologies. Until recently, "thin films" have primarily described layers of metallic or dielectric materials deposited onto substrates by evaporation, electron beam or ion beam techniques. Advances in sol-gel technology have extended film research to include "glassy" materials of either crystalline, or amorphous nature. Sol-gel films can be tailor-made to accommodate a diverse range of applications due primarily to flexibility in chemical make up which determines the respective film's structure. One important characteristic of such films is their inherent residual stress. This inherent stress, and the stress the film introduces to the substrate as it is deposited, can result in a complex stress profile. While "thin" in the case of sol-gel films generally means <1 μm in thickness, large (10 to 100's of nm of retardance) inherent stress per unit thickness can severely limit a film's performance and subsequent application. Described is an effort to quantify the residual stress in silica-based sol-gel films as a function of several processing parameters.

48137 (INIS-mf—10956, pp 37) **Shielding design on neutron radiography facility for Koeberg fuel pins.** Van Rooyen, T.J. (Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48138 **(KFK—4213) Gas contrasting of multiphase and composite materials.** Nold, E.; Ondracek, G. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung). Mar 1987. 9p. (In German). Special print from Z. Werkstofftech. (Dec 1985) Vol. 16(12) p. 407-413.

This report consists of two special reprints: 1. G. Ondracek: Z. Werkstofftech. (Dec 1985) v. 16(12) p. 407-413; 2. E. Nold, G. Ondracek: 'Investigations about the structure of interference coatings on gas-contrasted HfC-Co hard metal', from Prakt. Metallogr. (1986) v. 23 p. 268-276. The two different abstracts may be taken from the original literature.

48139 (MLM—3419, pp 9-15) **Application of failure analysis techniques.** Worley, C.M. Feb 1987. NTIS, PC A03/MF A01. File Number DE87008396.

In Materials science and characterization: Technology update-87.

The Materials Science Section at Mound is routinely called upon to perform failure analyses on a wide variety of materials with a variety of failure modes. Available as analytical tools are techniques such as scanning electron microscopy (SEM), energy dispersive x-ray (EDX), metallography, optical microscopy, ferrofluid, hardness, and mechanical testing. The Five cases are discussed that give an indication of the kind of failure analysis capability that is available at Mound. Process operation failures do not occur all that often, but, when a problem does arise, the specialists are able to apply the appropriate analytical technique(s) as required to determine the cause of failure.

48140 **(ORNL/TM—10354) Needs assessment for nondestructive testing and materials characterization for improved reliability in structural ceramics for heat engines.** Johnson, D.R.; McClung, R.W.; Janney, M.A.; Hanusiak, W.M. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 91p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000040.

A needs assessment was performed for nondestructive testing and materials characterization to achieve improved reliability in ceramic materials for heat engine applications. Raw materials, green state bodies, and sintered ceramics were considered. The overall approach taken to improve reliability of structural ceramics requires key inspections throughout the fabrication flowsheet, including raw materials, greed state, and dense parts. The applications of nondestructive inspection and characterization techniques to ceramic powders and other raw materials, green ceramics, and sintered ceramics are discussed. The current state of inspection technology is reviewed for all identified attributes and stages of a generalized flowsheet for advanced structural ceramics, and research and development requirements are identified and listed in priority order. 164 refs., 3 figs.

48141 **(RFP—4121) Precision metrology comparing ultrasonic and other techniques for the determination of steel thickness.** Blessing, G.V.; Eitzen, D.G.; Clark, A.V. Jr.; Schramm, R.E. (National Bureau of Standards, Washington, DC (USA); National Bureau of Standards, Boulder, CO (USA)). Jun 1987. Contract AC04-76DP03533. 27p. (CONF-870691—2). NTIS, PC A03. File Number DE87011051.

From Review of progress in quantitative NDE; Williamsburg, VA, USA (21 Jun 1987).

The accurate in-situ measurement of part dimensions during fabrication is of much interest to the manufacturing industry, especially for untended manufacturing. The goal of this work is to apply noncontacting ultrasonic techniques to the precise thickness measurement, during machining, of parts of rotation possessing a nominal wall thickness of 1.5 mm. The required accuracy is +-2.5 μm at all points on the approximately 250 mm diameter steel shell. The approach is to precisely measure ultrasonic echo transit times, and calculate part dimensions from an accurate knowledge of the material sound speed. To that end, feasibility results on flat disk specimens possessing a wide range of grain sizes have been obtained. Both longitudinal (10 to 30 MHz) and shear (3 MHz) wave measurements were made, the latter using electromagnetic acoustic transducers. Comparisons were made of the calculated ultrasonic values with precision interferometer dimensional measurements, revealing a significant dependence of ultrasonic accuracy on sample grain size. Satisfactory agreement was observed for all grain sizes using longitudinal waves, but only for the finer grain specimens using shear waves. The resulting dominance of grain size in limiting ultrasonic accuracy, especially for shear waves, was evaluated in light of a model treating the samples as random aggregates of cubic crystals. 9 refs., 14 figs.

48142 **(SAND—87-0727C) Models for penetration of thin plates.** Passman, S.L. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 5p. (CONF-870753—74). NTIS, PC A02. File Number DE87013727.

From 5. topical conference of the American Physical Society on shockwaves in condensed matter; Monterey, CA, USA (20 Jul 1987).

A model is developed for breakup of a cylindrically symmetric body which has impacted normally on a thin plate, where the speed of impact is very high. This model exhibits different qualitative breakup phenomena than those for lower speeds of impact. Comparison of the model with results computed with the two-dimensional wavecode CSQ shows good agreement.

48143 **(STEV-FBT—87-6) Fluidized bed materials. Stage 5, final report.** Haeggblom, E.; Poturaj, S.; Groenwall, B. (Statens Energiverk, Stockholm (Sweden); Studsvik Energiteknik AB, Nykoeping (Sweden)). 9 Oct 1986. 70p. (In Swedish and English). (STUDSVIK-EX—86-77). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753102.

1. Four Cermotherm 2040 thermocouple sheaths which failed in the circulating fluidized bed combustor (CFBC) at Studsvik have been investigated. The catastrophic corrosion observed was due to the violent oxidation of molybdenum in the oxidizing atmosphere in the temperature range 700 - 850 degree C. 2. A selection of high temperature materials have been corrosion tested in a bubbling FBC fired with community waste and another one fired with woodchips. The aim was to assess the suitability of the materials as thermocouple sheaths. Waste burning gave a corrosion rate 6 - 12 times higher than woodchips burning. Aluminium alloyed high-chrome ferritics showed similar or better behavior than austenitic steels. Ferritics without aluminium showed considerably higher corrosion rates. Nickel-based alloys was no better than ironbased. Stellite proved to be very resistant material in the waste burning environment. Some corroded components from the combustor itself were also investigated. 3. Wear of the tube bank has been measured in a bubbling FBC. The tubes in the hot water plant have suffered from rapid erosion rates. (authors).

48144 **(VTT-TUTK—434) Real time analysis of the results from mechanized ultrasonic testing.** Lahdenperae, K.; Lipponen, A.; Sandlin, S. (Valtion Teknillinen Tutkimuskeskus, Espoo (Finland)). Sep 1986. 35p. (In Finnish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87752511.

A mechanized ultrasonic testing equipment has been built in the Technical Research Centre of Finland. The equipment can be used for ultrasonic testing of plates and pipes having a diameter in excess of 200 mm. A large computer program has been written for analyzing results and reporting. A micro/PDP-11 with 512 kbyte central memory, a 10 Mbyte Winchester disk and dual 700 kbyte diskettes have been selected for the computation and the operating system is RT11. Measurements were made with a four channel - computer controlled - ultrasonic device KB 6000. The communication between the computer and the KB 6000 occurs via an interface unit DRV11J. The reporting is made with microprocessor based matrix printer Genicom 3404 working in graphic mode. As a result A-, B- and C-figures are produced from the inspected volume. From these figures two projections of the reflectors as well as the amplitude can be seen. The inspection parameters are also included. Afterwards the results can be reanalyzed from data stored on disc and for example, an other reporting level can be used. In the case of four transducers two figures are printed out. The results from the opposite transducers are printed in the same figure. The measurements are coordinated using interrupt signals produced by the independent controller of the manipulator. Subroutines for giving the initial values of the program and helpful hints for the user are included in the program. With the graphic monitor VT240 one can get an image of the weld to be tested including the position of transducers, their scanning movement and of the volume to be inspected. There are also programs to be used for inspecting the base material.

48145 (ZfK—590, pp 18) **Studies on the adsorption behavior of elemental iodine at selected materials.** Guethert, A. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

4208 Electronic Circuits And Devices

REFER ALSO TO CITATION(S) 47850, 48113, 48172, 48233, 48259, 48276, 48277, 48295

48146 **(ITEF—135-1986) 21-bit digital-to-analog converter and its calibration technique.** Popov, V.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 23p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703287.

An algorithm of precise calibration and digital correction of a digital-to-analog converter (DAC) is described. The calibration technique, problems of reducing the effect of random errors of measurements on the final result of calibration are discussed. The described technique makes up the basis for development of a high-current fast-response DAC with non-linearity corresponding to the 21-st order and time of establishing the current of — 0.2 μs. High accuracy is provided by periodic DAC calibration and digital correction of the input code. The suggested algorithm can be used for increase of accuracy of integral DAC. 6 refs.; 2 figs.

48147 **(SAND—87-2001C) Dual S/X-band RV antenna.** Sena, M.D.; Bentz, R.D. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 19p. (CONF-8710139—1-Vugraphs). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014853.

From Instrumentation antenna technology conference; Atlanta, GA, USA (6 Oct 1987).

This paper provides specifications and conceptual design of reentry vehicle antennas. A comparison of the types of shared aperture antennas (single cavity-multiple probe; single cavity-single probe; and multiple cavity-individual probe) is discussed. A description of the multiple cavity configuration and fabrication details are presented. Also shown are tuning conditions, VSWR vs frequency plots, isolation vs frequency plots; radiation patterns, and environmental requirements. (FI)

48148 **(UCRL—53700-86) Electronics engineering thrust area report, FY 86.** Phelps, P.; Genin, M.; Hymer, J.; Essary, K.; Middleton, C.; Kirvel, B.; Adye, P. (eds.). (Lawrence Livermore National Lab., CA (USA)). Jun 1987. Contract W-7405-ENG-48. 214p. NTIS, PC A10/MF A01; 1; GPO Dep. File Number DE87014616.

The Electronics Engineering Department has identified specific engineering technologies, called thrust areas. The six areas reported on in the present report are: Diagnostics and Microelectronics Engineering; Modeling and Simulation; Remote Sensing, Image, and Signal Engineering; Microwave and Pulsed Power Engineering; Computer Technologies; and Dynamic Systems and Control. Six analytics were prepared for the areas covered in this report. (JDH)

48149 (UCRL—53700-86, pp 1.1-1.53) **Diagnostics and microelectronics engineering.** Jun 1987. NTIS, PC A10/MF A01. File Number DE87014616.

In Electronics engineering thrust area report, FY 86.

This section covers several areas concerning microelectronics in general. Described are semiconductor windows transparent to x-radiation for use in experimental areas, design and testing of photoconductive switches, gallium arsenide integrated circuits, data transmission by fiber optics methods, pulse circuits, and CAD, CAM, CAE of microelectronics. (JDH)

48150 (UCRL—53700-86, pp 2.1-2.48) **Engineering modeling and simulation.** Jun 1987. NTIS, PC A10/MF A01. File Number DE87014616.

In Electronics engineering thrust area report, FY 86.

This section reports on applications of computer modeling and calculation to solve problems. Specific areas covered are: (1) finite element solutions of electro/magneto-static fields; (2) solutions of Maxwell's equations; (3) coupling of electromagnetic waves in an opening; (4) modeling of a crystal streak camera; (5) computer studies of high-voltage electrical pulses on semiconductor devices; (6) computer analysis of microwave pulse compression; (7) circuit analysis codes; and (8) studies of superlattices. (JDH)

48151 (UCRL—53700-86, pp 3.1-3.36) **Remote sensing, image, and signal engineering.** Clark, G.A. Jun 1987. NTIS, PC A10/MF A01. File Number DE87014616.

In Electronics engineering thrust area report, FY 86.

This section treats projects in the field of signal processing. Topics include video image processing with personal computers; image processing of data from synthetic aperture radar satellites; application of a digital signal processing chip; expert system evaluation of seismic data with emphasis on nuclear weapon testing detection; and image processing computer codes. (JDH)

48152 (UCRL—53700-86, pp 4.1-4.35) **Microwave and pulsed power engineering.** Jun 1987. NTIS, PC A10/MF A01. File Number DE87014616.

In Electronics engineering thrust area report, FY 86.

This section deals with high-power microwave and pulsed power technologies. Areas reported on are high-power microwave sources, dielectrics, and high voltage switches. (JDH)

4209 Waste Processing Plants And Equipment

REFER ALSO TO CITATION(S) 47264

4210 Combustion Systems

REFER ALSO TO CITATION(S) 47065, 47066, 47099, 47107, 47111, 47114, 47269, 47345, 47352, 48128, 48131

48153 **(DOE/ID/12597—1) Oxygen enriched combustion system performance study: Phase 1, Interim/final report: Volume 1, Technical and economic analysis.** Kobayashi, Hisashi. (Union Carbide Corp., Tarrytown, NY (USA). Linde Div.). Mar 1987. Contract AC07-85ID12597. 117p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE87014930.

Technical and economic feasibility of using oxygen enriched combustion (OEC) and preheated oxygen enriched combustion (POEC) for industrial furnace applications was evaluated. The potential for fuel savings and productivity improvements with OEC/POEC systems was parametrically analyzed for a broad range of furnace conditions including those for steel heating, glass melting and aluminum melting. The changes in combustion characteristics with OEC were reviewed and their effects on furnace applications discussed. Relative advantages of different enrichment techniques, safety considerations and the effects of OEC on combustion-generated pollutants were also evaluated. The characteristics and economics of the state-of-the-art oxygen generation methods including PSA, membrane and cryogenic systems were evaluated to identify cost effective methods of supplying oxygen enriched air. The potential synergistic effects of combining preheating and oxygen enrichment were investigated by analyzing fuel savings and the capital and operating costs. The overall process economics of conventional heat recovery systems, and various OEC/POEC systems were compared.

48154 **(DOE/PC/90266—T2) Design, fabrication and testing of an advanced cyclone coal combustor of an industrial boiler, using coal slurries as a fuel: Phase 2, Combustor installation and test: Final report, June 3, 1985 to June 15, 1987.** (Coal Tech Corp., Merion, PA (USA)). 15 Jun 1987. Contract FG22-86PC90266. 35p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013443.

The present project covers the second phase of a three phase project to develop, at a commercial scale, an air cooled, cyclone coal combustor for application to the conversion of oil/gas designed boilers to coal. This combustor is designed to retain sufficient ash inside the combustor to allow its use in oil/gas designed boilers; and to simultaneously reduce the NO/sub x/ and SO_2 emissions to levels that meet or exceed the EPA New Source Performance Standards. During this second project phase, a 30 MMBtu/hr capacity combustor was installed on a 23 MMBtu/hr, oil designed package boiler at the Keeler plant in Williamsport, PA. Two parametric tests with a total duration of 40 hours were performed. A total of 10 tons of coal water slurry was consumed. The combustor operated as designed, especially the critical air cooling and slag tap sections of the combustor. It was determined that the combustor is capable of efficiently burning the slurry fuel at stoichiometric conditions in the combustor. 10 refs., 9 figs., 1 tab.

48155 **(STEV-FBT—87-7) Determination of causalities between the variables by means of multivariate analysis.** Johansson, A.; Bergdahl, B.G.; Oguma, R.; Aakerhielm, F. (Statens Energiverk, Stockholm (Sweden); Studsvik Energiteknik AB, Nykoeping (Sweden)). 19 Nov 1986. 68p. (In Swedish). (STUDSVIK-EP—86-73). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753103.

The aim of the project is to study the interaction between three variables in a circulating fluidised bed: O/sb2/-content, NOsb(x)-content, and pressure drop /DELTA/p in the reactor. The method used is multivariate analysis applied to dynamic systems, which means that the interesting parts are the fluctuations (noise) of the signals - not the actual level. The noise for all the signals enter a computer where dynamic models are built up by a recursive method. The means to determine the causalities between

the variables are the power spectras. By a special mathematical technique the spectra for each variable is divided into different areas corresponding to the noise contributions from the other variables. The action is then determined from the dynamic models by step response calculations, which show the gradient and the dynamic properties for the causality. The result attained is that the NOsb(x)-content strongly depends on the O/sb2/-content and that O/sb2/-content depends on /DELTA/p. No other significant causalities are found. The method can be used for more effective test programs in research and development work. From one test case it is possible to decide the variables being interesting to change. The further testing will then be stated from the unlinearities of the different variable connections. (authors).

48156 **(STEV-FBT—87-9) Fluidized bed sensor signals analysed by means of noise technique.** Aakerhielm, F.; Bergdahl, B.G.; Johansson, A. (Statens Energiverk, Stockholm (Sweden); Studsvik Energiteknik AB, Nykoeping (Sweden)). 29 May 1987. 40p. (STUDSVIK-NR—84-418; STUDSVIK-EB—84-68). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753107.

An investigation of the dynamic characteristics of a cold fluidized bed loop has been performed using noise techniques. The goal is to characterize the fluidization state by use of normal process sensors such as pressure drop over bed and air flow meter. To improve the interpretation two capacitive probes are installed in the bed. Air flow rate to the bed and bed height are variation parameters. The influence of cooling tubes is also studied. The results demonstrate that the noise technique has a great potential of providing information on dynamic processes. (G.B.).

48157 **(STEV-FBT—87-14) Modelling of circulating fluidised bed combustion systems.** Brereton, C. (Statens Energiverk, Stockholm (Sweden); Studsvik Energiteknik AB, Nykoeping (Sweden)). Nov 1985. 111p. (STUDSVIK-EB—85-83). NTIS (US Sales Only), PC A06/MF A01. File Number DE87753108.

This report is divided into three sections each dealing with a specific aspect of the modelling of circulating bed combustion systems. In section I the literature concerning circulating bed combustion is reviewed and the conclusion is reached that our knowledge of fluid mechanic and heat transfer processes is insufficient at this time to permit more than empirical modelling. Based upon this conclusion sections II and III and IV of the study were performed. Sections II involved development of a simple model to estimate radiative heat transfer and comparison of this model with available experimental data. Finally section II involved development and testing of a small needle capacitance probe. Initial result with this probe give some insight into the boundary layer structure. We hope that with further work it will be possible to develop more comprehensive models of the bed fluid mechanics. These should aid in estimation of pollutant formation, heat transfer, and density profiles.

48158 **(STEV-FGT—87-2) Gasification by means of a circulating fluidized bed for oil substitution in lime kilns - construction and operation of a pilot plant.** Lindman, N. (Statens Energiverk, Stockholm (Sweden)). 1987. 24p. (In Swedish). NTIS (US Sales Only), PC A02/MF A01. File Number DE87753114.

During the first phase of the project 'Foersoeksanlaeggning - GES', July 1985 - December 1986, Goetaverken Energy Systems AB has designed an built a pilot plant for gasification of bio fuels in a circulating fluidized bed (CFB). The plant has a capacity of 400 kg fuel per hour. A total of 425 hours' experimental runs have been performed in the course of nine months. The pilot plant has been used for proof-of-concept and for development of special components in the gasifier system. The commercial application of the gasification process is mainly for oil substitution in the lime kilns of the kraft pulp industry. Goetaverkens first commercial gasifier is presently installed at Soedra Skogsaegarnas pulp mill at Vaeroe Bruk, south of Goeteborg. The commissioning is scheduled for July 1987.

48159 **An experimental study of pulsed fluidized beds.** Moussa, N.A.; Fowle, A.A.; Hall, A.W. (Arthur D. Little, Inc., Cambridge, MA). pp 1141-1146 of Proceedings of the 1987 international conference on fluidized bed combustion: FBC comes of age. Mustonen, J.P. New York, NY; American Society of Mechanical Engineers (1987). (CONF-870540—).

From 9. international conference on fluidized bed combustion; Boston, MA, USA (3 May 1987).

An experimental study of the effects of flow pulsation was carried out on a cold-flow model of a fluidized bed of sand. The fluidizing air was supplied by a blower. A solenoid valve, triggered by a solid state timer was set to yield various frequencies and intermittencies (fractions of cycle time when the air flow is on). The instantaneous flow rate and pressure drop across the bed were measured and synchronized with cine photography of the bed motion. Major observed dynamic effects included: an interstitial gas velocity that exceeded the steady-state minimum fluidization velocity; and bubbles breakage and collapse inside the bed. It was concluded that quasi-steady flow analyses can be used for baseline design of a pulsed, noncombusting, fluidized bed, with additional tailoring of the pulsation to produce the dynamic effects. These effects offer the promise of reducing gas short-circuiting of the bed through the bubble phase, enhancing transport processes within the emulsion phase and between the emulsion and bubble phases.

48160 **Materials for FBC air heater applications.** Natesan, K.; Miller, S.A.; Podolski, W.F. (Chemical Technology Div., Materials and Components Technology Div., Argonne National Lab., Argonne, IL). pp 802-811 of Proceedings of the 1987 international conference on fluidized bed combustion: FBC comes of age. Mustonen, J.P. New York, NY; American Society of Mechanical Engineers (1987). (CONF-870540—). Contract W-31-109-ENG-38.

From 9. international conference on fluidized bed combustion; Boston, MA, USA (3 May 1987).

The U.S. DOE-sponsored Atmospheric Fluidized-Bed Cogeneration Air Heater Experiment (ACAHE) is intended to assess the performance of various heat exchanger materials in order to establish confidence in the resultant designs of fluidized-bed combustion (FBC) air heater systems. Westinghouse Electric Corp. is preparing specifications and hardware for the ACAHE. Argonne National Laboratory (ANL), through a contract with the Rocketdyne Division of Rockwell International, will conduct the tests in the DOE 6-ft by 6-ft AFBC facility in El Segundo, California. This paper presents a brief overview of the project, followed by a summary of the materials assessment work at ANL. Pertinent high-temperature materials exposure data and a possible corrosion mechanism in FBCs are discussed. Results from laboratory-scale corrosion experiments are then presented.

48161 **The effect of fuel burn rate on pulse combustor tail pipe velocities.** Dec, J.E.; Keller, J.O. (Univ. of Michigan, Ann Arbor, MI). pp 498-507 of Proceedings of the 1986 international gas research conference. Cramer, T.L. Rockville, MD; Government Institutes Inc. (1986). (CONF-860904—).

From International gas research conference; Toronto, Canada (8 Sep 1986).

Pulse combustor tail pipe velocities were measured using laser Doppler velocimetry (LDV). Ensemble-averaged velocity profiles, time resolved with respect to the combustor cycle, and velocity-time records at a point are presented. The velocity-time records allow the magnitude of the tail pipe velocity oscillations to be studied as combustor operating conditions are varied. The mass flux and equivalence ratio of reactants supplied to the combustor were varied systematically and the effect on the oscillations noted. To isolate the effects of fuel and air mixing, both conventional (separate fuel and air) and premixed injection systems were used. Combustion chamber pressure oscillations were also measured and are compared with the tail pipe velocity oscillations. A strong inverse relationship between pulsation magnitude, measured either by velocity or pressure, and energy release was found.

4220 Underground Engineering

REFER ALSO TO CITATION(S) 47238

48162 **(BFR-R—36-1986) Power and energy requirements in an underground workshop.** Winqvist, T. (Swedish Council for Building Research, Stockholm). 1986. 45p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753081.

Energy consumption in an underground workshop (blasted out of the bedrock) has been measured over an 18-month period. The specific annual heating energy requirement amounted to 230 kWh per m/sp2/ and 31 kWh per m/sp3/. Energy losses consist of transmission losses (18 percent), ventilation (losses 53 percent), cooling requirements (4 percent), energy uptake by evaporation (24 percent) and others (1 percent). Of these losses about 10 percent are recovered. More efficient heat recovery would significantly reduce the heating energy requirement. The values stated above do not include losses resulting from uncontrolled ventilation or from operation of equipment not justified by climate conditions, as occurred during the measurement period. The underground workshop premises are situated in central northern Sweden in drained granitic rock. Workshop volume is 28,500 m/sp3/, floor area 3 900 m/sp2/, mean interior temperature 18 degree C, with an air change rate of 1.6 changes per hour during 2 300 hours operation per year. Transmission losses are constant throughout the year, while ventilation losses naturally depend on the outdoor temperature. Heat lost by evaporation of water varies from one time of year to another depending on groundwater ingress form a small rapidly responding groundwater system. In this part of the country, the groundwater level is determined primarily by thawing of the winter snow, and is lowest during the coldest period of the year and reaches a maximum in June. The workshop's power requirement is therefore greatest during March.

4230 Marine Engineering

48163 **(STF—71A86005) Wind loads on the Valhall quarters platform on the Norwegian continental shelf. Model tests and comparison with full-scale measurements.** Bech, A.; Hjort-Hansen, E. (SINTEF, Trondheim (Norway)). Jun 1986. 47p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753070.

A block-like oilrig superstructure standing on a jacket platform was modelled on the scale of 1:300, together with its two neighbouring platforms. Model test results of mean-, root-mean-square- and peak loads due to turbulent airflow are shown for different wind directions. The loads are two horizontal projections and a moment about a vertical and central axis. Power spectra of horizontal wind turbulence and of wind loads are shown for selected cases. The joint acceptance function for the transfer from wind turbulence to integrated wind loads is shown. Some of the results lend themselves for comparison with full-scale measurements, which were available prior to the model tests. 8 references, 27 figures, 2 tables.

4240 Pollution Control Equipment

REFER ALSO TO CITATION(S) 47062

48164 **(SVF—234) Flue gas cleaning and heat recovery in refuse incineration at Avesta.** Schuisky, G.; Thoernkvist, J.; Hedman, K. (Stiftelsen foer Vaermeteknisk Forskning, Stockholm (Sweden)). Jul 1986. 149p. (In Swedish). NTIS (US Sales Only), PC A07/MF A01. File Number DE87753096.

Environmental demands concerning incineration have intensified considerably during the past few years. Attention has been directed towards the discharge of hydrogen chloride and of mercury and other heavy metals. PAH and dioxines have also been discussed. The studies carried out in Avesta indicate that applying the principle of flue-gas condensation to incineration provides a satisfactory separation of hydrogen chloride and mercury, while the reduction in particle-bound pollutant is more limited. The degree of separation for organic compounds cannot with certainty be specified since the material studied is too limited. The only measurement of dioxines and PAH which is presented does, however, indicate that a good purification effect can be obtained. The pollutants which are separated in the flue-gas cooler are collected in the condensate, where the high concentrations of hydrogen chloride give a very low pH-value. This leads to the release of particlebound metals, resulting in a waste water with a high concentration of heavy metals. This waste water has highly corrosive properties, as a result of the low pH-value in combination with high chloride and fluoride concentrations. A comprehensive purification is necessary in order to discharge the condensate into the recipient, or to a municipal sewage treatment plant. A satisfactory purification effect is obtained by alkalization and addition of merkaptan or sulphide. The sludge produced during purification has a dry solids content of 4-6 percent after thickening. An increase of the dry solids content can be attained through mechanical dewatering or the addition of fly ash. The leaching studies demonstrates that heavy metals are only leached to a small extent. In the case of disposal under controlled conditions leaching is further diminished. (authors).

4250 Power Cycles

REFER ALSO TO CITATION(S) 47656

48165 **(LTKK-EN-C—42) Application of Organic Rankine Cycles (ORCs) to decentralized power generation. Preliminary study.** Huovilainen, R.; Alamaeki, J.; Tarjanne, R. (Lappeenrannan Teknillinen Korkeakoulu (Finland). Energiatekniikan Laitos). 1987. 135p. (In Finnish). NTIS (US Sales Only), PC A07/MF A01. File Number DE87753331.

The study concentrates on MW-class ORC processes that could be utilized in connection with different kind of power plants. The use of an ORC-process may offer potential for improvements in two ways; first, an ORC-process can be suitable with low-grade thermal sources where water based power generation is not feasible. Second, an increase in power generation efficiency is achieved. The connection of an ORC-process to following plants were investigated; a gas burning heat-only boiler, a solid fuel boiler, a steam and gas turbine (co-generation) unit, a steam turbine and a heating reactor. In each case the following economical factors for adding an ORC-process were calculated; the cost for electricity, the return of investment (ROI) and the pay-back period. The most favorable cases to utilize an ORC-process are a heating reactor, a steam turbine and a gas turbine based co-generation plant. In connection with heat-only plants a better economy were achieved than with co-generation plants. The results indicate that there can be found economically promising applications for ORC-processes in industry and power plants. It is evident that those cases should be investigated more in detail. ORC-processes allow power generation in new circumstances and can increase the efficiency of power plants. More emphasis should be paid for the R and D of this relatively new technology.

48166 **(ORNL/TM—10475) Stirling engines and irrigation pumping.** West, C.D. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 37p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000020.

This report was prepared in support of the Renewable Energy Applications and Training Project sponsored by the US Agency for International Development for which ORNL provides technical assistance. It briefly outlines the performance that might be achievable from various kinds of Stirling-engine-driven irrigation pumps. Some emphasis is placed on the very simple liquid-piston engines that have been the subject of research in recent years and are suitable for manufacture in less well-developed countries. In addition to the results quoted here (possible limits on M^4 and pumping head for different-size engines and various operating conditions), the method of calculation is described in sufficient detail for engineers to apply the techniques to other Stirling engine designs for comparison. The liquid-piston Fluidyne is a form of Stirling engine sharing many of the characteristics of conventional kinematic and free-piston Stirling machines. The use of liquid pistons, however, gives it some unique advantages as well as certain problems that are not encountered or are not important in engines with solid pistons.

Because the output is naturally available in the form of an oscillating liquid flow or a fluctuating pressure, the Fluidyne is well suited to liquid pumping, but other applications have also been considered. 27 refs., 7 figs., 2 tabs.

43 PARTICLE ACCELERATORS

4301 Design, Development, And Operation

REFER ALSO TO CITATION(S) 48294, 48773, 48866

48167 (ANL-PHY—87-1, pp 197-235) **The J.R. MacDonald Laboratory upgrade: "Ion-collision physics facility: CRYEBIS + LINAC": Status report, January 1987.** Richard, P. (Kansas State Univ., Manhattan). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

This paper describes the planning and procedures used to fund and construct CRYEBIS and LINAC research facilities at Kansas State University. A budget for the lab is presented. Drawings of the equipment layout are included. The computer systems associated with the ion sources and experimental areas are given. (JDH)

48168 (ANL-PHY—87-1, pp 237-252) **Direct sources of low energy multiply charged ions.** Kostroun, V.O. (Cornell Univ., Ithaca, NY). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

Over the past twenty years, a number of sources of multiply charged ions have been developed for nuclear particle accelerators. Two of these, the Electron Cyclotron Resonance Ion Source (ECRIS) and the Electron Beam Ion Source (EBIS) are, and probably will remain for some time, the most convenient sources of beams of low energy, highly charged ions. They are finding increasing use in atomic physics and with either one or the other, it is possible, in principle, to obtain ions of almost any element. The ECRIS can generate intense beams of highly charged low to medium Z elements, while the EBIS has produced the highest extractable charge state of any source, in one case Xe^{52+} has been obtained. This paper describes the principles behind the machines and their uses.

48169 (ANL-PHY—87-1, pp 267-283) **The ATLAS [Argonne Tandem-Linac Accelerator System] accelerator facility.** Pardo, R.C. 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

The ATLAS accelerator facility provides beams of heavy ions in the mass range $7 \leqq A < 120$ for research in nuclear and atomic physics. The facility consists of an electrostatic tandem injector and an independently-phased superconducting resonator linac. The system can be operated in a variety of model including deacceleration of beams which have been stripped to highly-charged states for atomic physics. This paper describes the ATLAS facility in detail and discusses the deacceleration mode for some specific cases.

48170 (BNL—40089) **Low energy antiproton possibilities at BNL.** Lee, Y.Y.; Lowenstein, D.I. (Brookhaven National Lab., Upton, NY (USA)). 1987. Contract AC02-76CH00016. 14p. (CONF-8710125—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013318.

From 2. Rand antiproton conference; Santa Monica, CA, USA (6 Oct 1987).

Antinuclear physics in the energy range of 0 to 20 GeV has long been a mainstay of the high energy physics program at BNL. The emphasis of the experimental program in the last couple of years has however moved to other areas as new facilities in the world have come on line. The initiatives stimulated by the USAF has caused a renewed interest in the low energy capabilities at BNL, which are still very competitive and considerable for the production of low energy antiprotons. A synopsis is given of the present BNL accelerator plans and the near term possibilities for a high yield antiproton production experiment. This paper does not address the longer term facility possibilities of producing "large" amounts of antimatter. Parenthetically, even though several aspects of the program are of little interest for this audience, such as the Relativistic Heavy Ion Collider (RHIC) and the Stretcher, it is important to understand their parameters and impact upon various possible antinucleon initiatives at BNL.

48171 (BNL—52082) **Proceedings of the 1986 summer workshop on antiproton beams in the 2-10 GeV/c range.** Lazarus, D. (ed.). (Brookhaven National Lab., Upton, NY (USA)). 7 May 1987. Contract AC02-76CH00016. 81p. (CONF-8608192—; AGS/EP/S—87-1). NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87012851.

From Summer workshop on antiproton beams in the 2-10 GeV/c range; Upton, NY, USA (18 Aug 1986).

The possibilities for building a facility for the formation spectroscopy of "charmonium" and the study of "exotics" at the AGS with high intensity antiproton beams of good resolution and enhanced purity are explored. The performance potential of a number of long beams and the AGS booster are evaluated and costs are estimated. Fluxes of several 10^7 antiprotons per pulse with purities of 5% to 99% are possible with conventional long beams. A similar total antiproton flux would be available with the Booster with no beam contamination. This could effectively be enhanced by two orders of magnitude by reducing the momentum spread in order to scan very narrow (less than 1 MeV) resonances. The maximum momentum attainable with the present Booster magnet design is 5.6 GeV/c which only reaches the Chi/sub 0/ (3415) charmonium state. Modifications are possible which would raise the maximum momentum to 6.3 GeV/c to include all states up to and including eta'/sub c/ (3590) in its range. The performance potential for this physics at the AGS is found to compare favorably with that at other laboratories with more antiprotons delivered annually, running in the post-Booster era, than at FNAL or Super-Lear with ACOL under typical scheduling conditions. A high resolution purified source of antiprotons in the 2-10 GeV/c range at BNL would cost $3.0M - $4.1M including an experimental hall. There are contributed papers in the appendices.

48172 (BNL—52096) **Report of the workshop on transferring X-ray Lithography Synchrotron (XLS) technology to industry.** Marcuse, W. (Brookhaven National Lab., Upton, NY (USA)). 1987. Contract AC02-76CH00016. 34p. (CONF-8707102—Summ.). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014301.

From Workshop on transferring X-ray lithography synchrotron (XLS) technology to industry; Upton, NY, USA (8 Jul 1987).

This paper reports on plans to develop an x-ray synchrotron for use in lithography. The primary concern of the present paper is technology transfer from national laboratories to private industry. (JDH)

48173 (CEA-CONF—8854) **Perspectives in heavy ion physics with the Saclay booster.** Harar, S. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service de Physique Nucleaire a Basse Energie). Oct 1986. 9p. (CEA-DPH-N-S—2415; CONF-8610253—3). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752607.

From 4. Franco-Japanese colloquium on nuclear spectroscopy; Seillac, France (7 Oct 1986).

At Saclay, a supra conducting linear accelerator as a booster of a Tandem Van de Graaff is under construction. Beam qualities are expected to be equivalent to those from a 25 MV Tandem: in addition a beam pulsation will be available. Recently new facets of heavy ion collisions around and below 10 MeV/u have been revealed. We will discuss some of them emphasing on beam qualities and experimental devices which are necessary to improve our knowledge in this field.

48174 (INIS-SU—418, pp 19-21) **High-current microsecond electron beam.** Gelkhvidze, P.K.; Ivanov, V.S.; Krementsov, S.I.; Rajzer, M.D. (AN SSSR, Moscow. Inst. Obshchej Fiziki). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

In Plasma physics. Collection.

Main accelerator parameters and results of experimental study of high-current relativistic electron beam (REB) with up to 1.0 MeV energy and duration of 1.0 μs are presented. Accelerator with capacitor circuit discharging directly on injector shapes REB with — 0.7 MeV electron energy, current — 4 kA, pulse duration — 0.6 μs, with good reproducibility of parameters. The beam is transported in a drift vacuum chamber in external magnetic field to the length of 50 cm. Total beam energy is — 1.7 kJ. 5 refs.; 3 figs.

48175 (KFTI—86-21) **Heavy ion accelerator (UTI-2).** Bezuglyj, V.V.; Bredikhin, M.Yu.; Il'enko, B.p.; Nekludov, I.M.; Knorenko, V.K. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 19p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703331.

The design and test results of the 2 MeV ion accelerator designed for science of materials are described. The UTI-2 accelerator is developed on the basis of the UTI-1 accelerator and equipped with an injector of five-charge ions of iron, chromium and other elements with beam intensity of 50-100 μA, source electromagnet, mass-separator, accelerating system, target complex, a system for doping materials and powders of different metals and alloys. The test results pointed out that metal ion beams with 4-6 charge degree and intensity up to 100 μA may be obtained by means of a plasma-arc source operating in a continuous mode. Metal ions in the total beam current makes up 55-85%. Yield of multicharge ions grows with increase of magnetic field strength and power introduced into the charge. Beam emittance of multicharge ions does not exceed 40 cmxmrad. The UTI-2 accelerator may be used both for studies on physical radiation damages and works on semiconductor ion doping. 14 references, 13 figures, 3 tables.

48176 (SLAC-PUB—4295) **The interdependence of parameters for TeV linear colliders.** Palmer, R.B. (Stanford Linear Accelerator Center, Menlo Park, CA (USA); Brookhaven National Lab., Upton, NY (USA)). Apr 1987. Contract AC03-76SF00515;AC02-76CH00016. 43p. (CONF-8706147—5; CONF-8703149—6). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014607.

From Workshop on new developments in particle acceleration techniques; Orsay, France (29 Jun 1987).

A call, at SLAC, for a design of a 0.5 + 0.5 TeV e^+e^- collider with a luminosity of at least 10^{33} cm^{-2} sec^{-1} has been made. In order to find whether such a machine is possible, approximate formulae are collected for many of the relations governing the design of a linear collider. It must be emphasized that these are often only approximate relations whose accuracy is not expected to be better than about 10%, and in some cases may be worse. Units throughout will be meter-kilogram-second (mks) unless otherwise stated. Given these relations, their interdependence is studied and parameter choices made. A self-consistent solution is found that meets specification and does not involve any exotic technologies.

48177 (UCRL—97210) **Economics of induction linac drivers for radiation sources.** Barletta, W.A. (Lawrence Livermore National Lab., CA (USA)). 15 Jun 1987. Contract W-7405-ENG-48. 20p. (CONF-8706192—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014721.

From Conference on undulator magnets for synchrotron radiation and free electron lasers; Trieste, Italy (23 Jun 1987).

Recent developments in high reliability components for linear induction accelerators (LIA) make possible the use of LIAs as large-scale, economical sources of radio-frequency (rf) power for many applications. One particularly attractive example of interest to high energy physicists is a "two-beam accelerator" version of a linear e^+-e^- collider at TeV energies in which the LIA is configured as a monolithic relativistic klystron operating at 10 to 12 GHz. Another example of keen interest to the fusion community is the use of the LIA to drive a free-electron laser operating at 200 to 500 GHz for use in heating fusion plasma via electron resonance cyclotron heating. This paper briefly describes several potential uses of LIA radiation sources. It discusses the physical basis for scaling our present experience with LIAs to the operating characteristics applicable to large-scale sources of rf power and synchrotron radiation. 14 refs., 6 figs., 1 tab.

4302 Beam Dynamics, Field Calculations, And Ion Optics

REFER ALSO TO CITATION(S) 48171, 48176, 48215, 48216, 48217

48178 (AD-A—182021/6/XAB) **Recirculating accelerator studies. Final report, 1 January 1985-31 March 1987.** Hughes, T.P.; Godfrey, B.B. (Mission Research Corp., Albuquerque, NM (USA)). 2 Jun 1987. 99p. (AMRC-R—922). NTIS, PC A05/MF A01.

Results of stability calculations for three types of high-current betatron (modified betatron, stellatron, solenoidal-lens betatron) are presented. For the modified betatron, stability is strongly dependent on the internal poloidal rotation frequency of the beam. When this frequency is close to zero, high-mode numbers are easily stabilized. For the NRL betatron parameters, the beam is predicted to become unstable when it accelerates above 1 MeV. For a 10 kA beam, several kiloamps remain circulating after saturation of the instability. High-energy simulations of the modified betatron show saturation without loss of current. Calculations for the stellatron show that background ions have a strong stabilizing effect on the negative mass instability, due to increased transverse focusing. The energy threshold for onset of instability agrees with experimental observation. An electromagnetic three-wave interaction is found to occur in the stellatron. Its growth rate can be very large, but parameters can be chosen to move it to short wavelengths where thermal effects should stabilize it. An anlaytic dispersion relation for the solenoidal-lens betatron is obtained using a multiple length scaled averaging method. The betatron is predicted to be stable at and slightly above its injection energy. Simulation for higher energy show a strong instability which substrates with some loss of current. Simulations of 10-kA beams in a solenoidal-lens betatron show similar results, suggesting that most of the current can survive the instability.

48179 (AD-A—182610/6/XAB) **Stochastic adaptive particle-beam tracker using Meer-filter feedback. Master's thesis.** Johnson, B.A. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Dec 1986. 210p. (AFIT/GE/ENG—86D-27). NTIS, PC A10/MF A01.

This research develops a realizable proportional-plus-integral (PI) feedback tracker to control a neutral-particle beam. The design is based on detecting the photoelectron events that are emitted from a laser-excited particle beam and the observed events are used by a Meer filter to locate the beam's centerline. The observed events are modeled by a Poisson space time process and are composed of both signal- and noise-induced events. The Meer filter is a stochastic multiple model adaptive estimator which is composed of a bank of Snyder Fishman filters and is designed to distinguish the signal-induced events from the noise-induced events. A target model is developed from a Gauss-Markov acceleration process, and the target states are estimated by a Kalman filter. The objectives of the research were to (1) select the best cost weighting matrices that minimize the RMS tracker error and enhance robustness, (2) simplify the Meer filter for easier on-line usage, (3) complete full-scale sensitivity and robustness analyses over all the Kalman and Meer filter parameters, and (4) develop on-line adaptive estimation of those parameters that greatly affect stability robustness and tracker performance. A fifth objective is to identify the source of instability, and to propose a solution that will insure stability during parameter variations.

48180 (BNL—52090) **Proceedings of the ICFA [International Committee for Future Accelerators] workshop on low emittance e^- -e^+ beams.** Murphy, J.B.; Pellegrini, C. (eds.). (Brookhaven National Lab., Upton, NY (USA)). 1987. Contract AC02-76CH00016. 245p. (CONF-8703149—). NTIS, PC A11/MF A01; 1; GPO Dep. File Number DE88000133.

From ICFA workshop on low emittance e/sup -/ -e/sup +/ beams; Upton, NY, USA (20 Mar 1987).

Separate abstracts were prepared for 19 papers in these conference proceedings. (LEW)

48181 **(GANIL-A—86-01) Beam diagnostics at Ganil in 1986.** Loyer, F. (Grand Accelerateur National d'Ions Lourds (GANIL), 14 - Caen (France)). 1986. 34p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752588.

Position and profile monitors are considered in the beam lines and in the separated sector cyclotron; beam current monitors are presented such as interceptive and non interceptive probes; then bunch length monitors with electron emission probes and x ray emission probes are reviewed; the knowledge of the beam central phase is essential for tuning and controlling the beam, so are beam central phase monitors. The use of these central phase measurements is presented. Counting system of beam turns is considered.

48182 **(GANIL-A—86-09) On line beam diagnostics at Ganil.** Loyer, F. (Grand Accelerateur National d'Ions Lourds (GANIL), 14 - Caen (France)). Oct 1986. 5p. (CONF-8610173—17). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752604.

From 11. conference on cyclotrons and their applications; Tokyo, Japan (13 Oct 1986).

This paper describes the beam diagnostics set at GANIL in 1986 or being designed at present. After reminding of the control system which allows to use these diagnostics efficiently, we give a brief technical description of any beam diagnostics which are used from the control room to tune and to control the accelerator. Lastly the probe locations along the beam lines and inside the cyclotrons are shown on drawings. This paper exists with few illustrations as a GANIL internal report.

48183 **(IFVE-OP—85-82) Optimization of axial-symmetric multilens focusing system for wide-spectra neutrino beams.** Garkusha, V.I.; Kartashev, V.P.; Novoskol'tsev, F.N. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703243.

Multilens focusing system optimization for neutrino beam channel has been considered on the basis of the proposed functionals. The two-lens system is shown to be sufficient to form a wide spectra neutrino beam in the TeV energy range. 6 refs.; 4 figs.

48184 **(IFVE-OUNK—85-129) Measuring characteristics of longitudinal high-frequency beam instability in the IHEP proton synchrotron.** Balbekov, V.I.; Gertsev, K.F.; Kopylov, L.I.; Mikheev, M.S.; Simonov, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703263.

Longitudinal beam instability accompanied by — 6 GHz frequency and 70-300 MHz band width SHF-radiation is observed at the IHEP proton synchrotron. Instability occurs in critical energy region and also at beam partial debunching at magnetic field flattop. Considerable increase in the bunche of phase volume due to instability bursts is observed. Emission spectrum have been investigated, and instability threshold characteristics have been measured. Dependence of the chamber impedance on the particle energy is determined on the basis of these data using locally-homogeneous beam model. Moreover, proton synchrotron chamber dispersion has been measured. It is shown that due to corrugations the vacuum chamber possesses decelerating properties, that causes a resonance dependence of its impedance on frequency. Thus calculated resonance frequencies are in a good agreement with the central frequencies of the synchrotron beam radiation, particle energies being different. 4 refs.; 6 figs.; 2 tabs.

48185 **(IFVE-OUNK—86-73) Longitudinal stability of a drift bunch.** Balbekov, V.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703265.

A bunch drifting in an accelerator at constant energy at the absence of external accelerating field is considered. The bunch is assumed to interact with a passive resonator, the band width being essentially lower than the resonance frequency but higher than the bunch repetition rate. It is shown that voltage induced in the resonator may result in noticeable change in equilibrium distribution of particles and increase of the bunch momentum spread. The effect manifests as a microwave instability and has almost threshold character. The "threshold" value corresponds to the prediction of the local-homogeneous beam model. A possibility of applying these results to the general acceleration mode with synchrotron oscillations is discussed. Comparison with experimental data obtained at the IHEP accelerator is carried out. 9 refs.

48186 (INIS-SU—409, pp 39-41) **Betatron oscillation degeneration in conditions of long-range focusing.** Moroz, E.M.; Shorin, K.N. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780002.

Kratkie Soobshcheniya po Fizike.; (no.10).

In Experimental and theoretical physics. Collection.

The results of the study of resonances of betatron oscillations of charged particles in the feebly focusing racetrack under the conditions of long-range focusing are presented. As the focusing of charged particles in the racetrack is realized by magnetic field in sectors, the increase of permissible distances between sectors is called as increase of focusing long-range and the focusing itself ensured with alternation of n values is called long-range focusing (n - magnetic field drop index). It is shown that under the conditions of long-range focusing possible is strong degeneration of betatron oscillation resonances leading to rarefaction of the resonance lines net and attenuation of tolerance for accelerator or charged particle storage parameters. 3 refs.; 3 figs.

48187 (INIS-SU—410, pp 14-16) **Long-range focusing.** Moroz, E.M.; Shorin, K.N. 1986. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87780176.

Kratkie Soobshcheniya po Fizike.; (no.9).

In Experimental and theoretical physics. Collection.

Particle motion was investigated in weakly focusing magnetic systems of the racetrack type. It is shown that on alternation of magnetic field index values in sectors of weakly focusing racetrack the increase of lengths of rectilinear gaps free of focusing lenses is permitted. 2 refs.; 3 figs.

48188 (INIS-SU—417, pp 47-50) **Relativistic beam energy variation under beam passage through inhomogeneous linearly polarized electromagnetic wave.** Serov, A.V. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

Relativistic beam interaction with H/sub 01/ inhomogeneous wave propagating in the rectangular waveguide is theoretically investigated. Depending on initial conditions the beam may be either accelerated by a wave or energize it. The results are compared with numerical calculations of particle dynamics in the waveguide. 1 ref.; 2 figs.

48189 (INIS-SU—418, pp 50-53) **Correction of the degree of synchrotron radiation polarization.** Dem'yanov, G.V.; Titov, A.V.; Shorin, K.N.; Yarov, A.S. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

In Plasma physics. Collection.

By magnetic field variation betatron oscillations of electrons resulting in depolarization of synchrotron radiation (SR) were suppressed. The experiment is carried out at the FIAN 600 MeV synchrotron by light filter radiation with a wavelength of 476 nm and spectrum halfwidth of 6 nm was recorded by a high-speed chamber

that provided each exposure with sufficient homogeneity of electron beam (— 0.2 MeV). Optical system was constructed according to a classical scheme; it enabled to measure Stokes parameters by combining polarizer and phase shifting plate. Arbitrary position of two polarizers with respect to synchrotron magnetic field and at the same time their mutual perpendicularity are important features of the method. SR polarization degree is increased up to 100% within the whole investigated range of angles; Stokes parameters and degrees of linear an circular polarization are corrected. 7 refs.; 3 figs.

48190 **(ITEF—62-1986) Admissible errors of parameters of a focusing channel of an induction linac with intense electron beam. 1. Conditions for beam-focusing channel matching and envelope oscillations.** Plotnikov, V.K. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 22p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703274.

The conditions for deriving the steady-state distribution function for intense electron beam charge density in a focusing-and-accelerating channel of an induction linac are considered. The amplitude of beam envelope oscillations initiated by instabilities in power supplies for the focusing-and-accelerating channel elements. The admissible instability values are estimated. While calculating the effect of the proper beam fields and its phase space is taken into account. 3 refs.; 7 figs.

48191 **(LA-UR—87-2714) Energy cascading in the beat-wave accelerator.** McKinstrie, C.J.; Batha, S.H. (Los Alamos National Lab., NM (USA); Rochester Univ., NY (USA). Lab. for Laser Energetics). 1987. Contract W-7405-ENG-36. 16p. (CONF-8706147—6). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014727.

From Workshop on new developments in particle acceleration techniques; Orsay, France (29 Jun 1987).

A review is given of energy cascading in the beat-wave accelerator. The properties of the electromagnetic cascade and the corresponding plasma-wave evolution are well understood within the framework of an approximate analytic model. Based on this model, idealized laser-plasma coupling efficiencies of the order of 10% do not seem unreasonable. 28 refs.

48192 **(NIIEFA-P-V—0711) Transverse components of the intrinsic field of a bunch in a resonator accelerator.** Vorogushin, M.F.; Chernogubovskij, M.A. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1985. 21p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703344.

Transverse components of a charged particle bunch intrinsic field, effect sufficiently the particle dynamics in a resonator and determine the accelerated beam limiting current, conditioned by the particle radial divergence. Solution of a problem, related to transverse components of the charged particle bunch intrinsic field in a resonator accelerator is performed by the delayed potential method. Boundary conditions are accounted using mirror images. Expressions for transverse component of intrinsic electric field and azimuth component of the magnetic one, are obtained, which agree well with the problem specific solutions and reveal the physics of intrinsic field formation. Analytical results, convenient for engineering calculations, are presented for rectangular shape bunches. 6 references, 6 figures.

48193 **(UCID—21082) The efficiency of a bremsstrahlung interrogator: Beam Research Program.** Barletta, W.A. (Lawrence Livermore National Lab., CA (USA)). Aug 1987. Contract W-7405-ENG-48. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000442.

One can estimate the energetics of using gamma radiation produced by a high energy electron beam as a means of ascertaining the mass of distant objects. Several approaches to converting beam energy to radiation are compared, including a nonmaterial "beamsstrahlung" converter. 4 refs., 7 figs.

48194 **Crystal x-ray accelerator.** Tajima, T.; Cavenago, M. (Department of Physics and Institute for Fusion Studies, The Universtiy of Texas, Austin, Texas 78712). *Physical Review Letters;* **59**: No. 13, 1440-1443(28 Sep 1987).

An ultimate linac structure is realized by an appropriate crystal lattice (superlattice) that serves as a "soft" irised waveguide for x rays. High-energy (—40 keV) X rays are injected into the crystal at the Bragg angle to cause Bormann anomalous transmission, yielding slow-wave accelerating fields. Particles (e.g., muons) are channeled along the crystal axis.

48195 **High-current simulation codes.** Haber, I. (Naval Research Laboratory, Washington, DC. 20375). *AIP (American Institute of Physics) Conference Proceedings;* **139**: No. 1, 107-132(25 Apr 1986). (CONF-8505164—).

From Workshop on high brightness, high current, high duty factor ion injectors; San Diego, CA, USA (21 May 1985).

The suitability of using P.I.C. codes to simulate intense ion beam is discussed by presenting examples of their use. The numerical methods employed in these codes, as well as their limitations, are explained and some examples are presented to illustrate possible consequences of these limitations.

48196 **Preliminary design and beam-dynamics study of a funneling line having low emittance growth.** Guy, F.W. (AT-1, MS H817, Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **139**: No. 1, 207-216(25 Apr 1986). (CONF-8505164—).

From Workshop on high brightness, high current, high duty factor ion injectors; San Diego, CA, USA (21 May 1985).

A theoretical design study has resulted in a conceptual funneling-line design that has a transverse emittance growth limited to only 15% based on beam-dynamics calculations. Two 2-MeV, 100-mA proton beams are funneled from a two-channel, 212.5-MHz radio-frequency quadrupole (RFQ) to a single beam suitable for injection into a 425-MHz linac. The design uses permanent-magnet quadrupoles, dipoles, and combined-function elements. The low emittance growth is obtained by arranging the focusing strength, the periodic structure, and the bending elements so as to minimize abrupt changes in the beam environment with consequent charge redistribution and space-charge-caused emittance growth.

4303 Auxiliaries And Components

REFER ALSO TO CITATION(S) 48168, 48180, 48231, 48284, 48711, 49185

48197 (ANL-PHY—87-1, pp 253-266) **Distributions of ions in axisymmetric traps.** Schmieder, R.W. (Sandia National Labs., Livermore, CA). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

Classical dynamics is used to analyze the motion of ions in axisymmetric traps. A typical trap consists of an electron beam propagating along a uniform magnetic field plus a set of external electrodes. Ionizing collisions cause the ions to proceed through a sequence of charge states. By means of a series of transformations, equilibrium phase space distributions of the ions are determined for arbitrary radial and axial trap potentials. These calculations will be useful for interpreting experiments on trapped ions and for understanding the behavior of advanced ion sources.

48198 (ANL-PHY—87-1, pp 285-290) **Uranium upgrade of ATLAS [Argonne Tandem-Linac Accelerator System].** Shepard, K.W. 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

The Argonne tandem linac accelerator system (ATLAS) is a heavy-ion accelerator consisting of a superconducting linear accelerator injected by a 9 MV tandem electrostatic machine. The linac consists of two sections, each providing roughly 20 MV of effective accelerating potential. Performance of ATLAS is limited in two important respects by the electrostatic injector. The beam intensity

is smaller than desired by some users, and ions in the upper half of the periodic table cannot be obtained from the tandem. The mass limitation results from the requirement of foil stripping in the high-voltage terminal of the existing tandem, the short lifetime of stripping foils for the heavier ions, and the voltage of the present machine. This paper describes a project currently underway to replace the tandem electrostatic accelerator with a new injector system. This system will consist of a positive-ion source on a 350 kV platform, and a very-low-velocity superconducting linac. The ultimate goal of the project is to provide an injector system which will allow ATLAS to accelerate uranium ions, and which will provide beam quality at least as good as obtained from the tandem.

48199 **(BNL—40224) Short-pulse high-current-density photoemission in high electric fields.** Fischer, J.; Srinivasan-Rao, T. (Brookhaven National Lab., Upton, NY (USA)). 1987. Contract AC02-76CH00016. 14p. (CONF-8706147—7). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014909.

From Workshop on new developments in particle acceleration techniques; Orsay, France (29 Jun 1987).

We present the experimental results of photoemission studies on thin wires of gold-coated tungsten, held at surface fields in the range of 10^6 to 3 x 10^8 V/m, and illuminated by 10 ps long, 4.66 eV photon laser pulses. The wire cathodes arranged coaxially in an anode experienced a surface-field enhancement of 10^2 to 10^3 over the applied voltage. We obtained current densities exceeding 10 kA/cm^2 from a 50 μm diameter wire, from a (50 x 400) μm^2 area, under partially space-change-limited conditions. The quantum efficiency for emission-limited cases was in the range of 10^{-5}. For these cases results using 50 μm and 4 μm diameter wires indicated linear dependence of charge density with optical energy density. The emission also scaled linearly with the emitting area. For surface fields above 3 x 10^7 V/m, a twofold enhancement of emission was observed for a tenfold increase in the field. 7 refs., 9 figs.

48200 **(DOE/ER/03130—26) Data acquisition and filtering, subgroups B (models) and C (software): Summary of Working Group 5.** Cutts, D. (Brown Univ., Providence, RI (USA)). 1985. Contract AC02-76ER03130. 5p. (CONF-8511150—13; COO—3130TC-26). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014481.

From Workshop on triggering, data acquisition and computing for high energy/high luminosity hadron-hadron colliders; Batavia, IL, USA (11 Nov 1985).

This report discusses design of data acquisition systems for the Superconducting Super Collider (SSC). The basic strategy is use of a microprocessor "farm" to analyze the large amount of data in an SSC experiment. (JDH)

48201 **(DOE/ER/03130—27) Modelling microprocessor farms for SSC [Superconducting Super Collider] data acquisition.** Cutts, D.; van Ingen, C. (Brown Univ., Providence, RI (USA); Fermi National Accelerator Lab., Batavia, IL (USA)). 1985. Contract AC02-76ER03130. 6p. (CONF-8511150—14; COO—3130TC-27). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014480.

From Workshop on triggering, data acquisition and computing for high energy/high luminosity hadron-hadron colliders; Batavia, IL, USA (11 Nov 1985).

Data acquisition, involving both data collection and accompanying filtering, is a crucial part of an SSC experiment. The extreme demands on the acquisition system for I/O bandwidth and real-time computation capability that makes irrecoverable event selections requires that the system operation be well designed and fully understood. Modelling is a valuable and perhaps necessary tool for a successful design of such complex systems. As a demonstration of the modelling process we have made a few studies of simple systems consisting of a large number of microprocessors arranged in a "farm", a system in which each event is routed from the digitization/readout crates directly to a single microprocessor, one of a large parallel array, which performs the complete software event filter on that event. Subsequent events are transferred in turn to other processor nodes which are idle. The results of our crude simulations agree with the expected performance of such farms, and suggest that realistic modelling of SSC acquisitions will be important. 3 figs.

48202 **(IFVE-OUNK—85-128) Calculation of the corrugated vacuum chamber longitudinal impedance.** Balbekov, V.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703262.

The longitudinal impedance of the IHEP accelerator corrugated vacuum chamber is calculated. The corrugation pitch is assumed to be small against the chamber diameter. The problem is solved by mapping of the inner chamber space onto a smooth pipe and by further averaging of equations over the corrugation pitch. The impedance for low frequences is obtained when wave-length is much longer in comparison with the corrugation pitch. It is shown, that the ground E-wave phase velocity may become less than light velocity. That results in resonant dependence of the impedance on frequency. The resonant part of the impedance is investigated in detail including the influence of the vacuum chamber non-uniformities. The results are in agreement with experimental data for the IHEP accelerator. 5 refs.; 7 figs.

48203 **(IFVE-OUNK—86-71) Diagnostic apparatus for scraper system of 70 GeV proton synchrotron.** Baranov, V.T.; Kuchinin, S.L.; Loginov, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703264.

Diagnostics apparatus for the scraper system of the 70 GeV proton synchrotron are described. They are designed for measuring circulating beam profile in a wide dynamic range, profile of the beam spilled onto the scraper. The data are obtained by detection of secondary particles produced on a mobile internal target as well as by the charge formed in an insulated target at the expense of secondary emission. An ionization chamber of 1 l volume was used as a secondary particle detector. A basic circuit for temperature control of interlocking system and the method of remote measuring the level of induced radiation in the absorber are given. 5 refs.; 7 figs.

48204 **(INIS-mf—10284) Test coil for the superconducting SUSE cyclotron.** Schneider, U. (Technische Univ. Muenchen, Garching (Germany, F.R.). Fakultaet fuer Physik). 12 Sep 1985. 100p. (In German). NTIS (US Sales Only), PC A05/MF A01. File Number DE87752781.

In the context of the project study for the super-conducting SUSE cyclotron as accelerator for the existing 13 MN tandem at the Munich Accelerator Laboratory, a superconducting main coil was built full-size and tested. The triangular coil (2.3 m wide, 2.7 m long, 0.38 m high, sector angle 50/sup 0/) is cooled indirectly by helium (two phase flow, 1.2 bar, 4.5 k) to T/sub B/ ≃ 5 k. The cooling phase of 300 k to T/sub B/<10 k takes about 5 1/2 days, and corresponds to the theoretically expected cooling time. After initial examination of the coil at currents up to 1000 A, in the first experiment, the coil current was taken to the limits of the mains supply equipment and I/sub max/ = 2800 A was reached without understressing. This corresponds to a current density of ≃ 90 A/mm/sup 2/ averaged over the coil cross section. The maximum field at the coil was about 4.4 T and the temperature was 5.3 k. By cooling from 300 k to 5 k, the windings wound in double discs are greatly prestressed, due to the different coefficients of expansion of the coil body (aluminium alloy) and the cast coil winding, so that they remain fixed in the winding chambers in spite of the high magnetic forces. The measured maximum deformations of below ≃ 20 μm remain lower than the predictions. The agreed design is a considerable reason why the coil shows no understressing effects.

48205 (INIS-SU—415, pp 57-62) **Equipment for operative control of electron ring size by luminosity of residual gas.** Tyutyunnikov, S.I.; Shalyapin, V.N. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178. (N—18-86).

In JINR rapid communications. Collection.

Equipment for the operative control of the electron ring size by luminosity of residual gas is described. This equipment allows one to regulate the size of relativistic electron beam with current larger than 10 A at pressure of residual gas in the 10/sup -5/-10/

sup -7/ Torr interval. The size of the luminosity region is measured by means of the system consisting of electron-optic converter (EOC) and dissector connected with a fiber optic contact. The threshold illumination of the EOC-dissector system is by the order of 5 lower than the EOC-photofilm. 4 refs.; 7 figs.

48206 **(ITEF—155-1985) Data acquisition system of a calorimetric bench.** Burov, S.I.; Klimentov, A.A.; Kutsenko, V.A.; Morgunov, V.L.; Semenov, Yu.A.; Fedotov, O.P.; Chudakov, V.N.; Shvachkin, B.V.; Shut'ko, V.E. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 36p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703292.

Data acquisition system (DAS) of a calorimetric bench is described. The system is an on-line complex on the basis of the "Ehlektronika-60" microcomputer. DAS ensures read-out, monitoring and data primary processing, data recording on magnetic tape, control of measurement round, control and adjustment of physical equipment, certain auxiliary functions. DAS operates in the framework of the RT-11 V 5.0 operating system under the control of the multiterminal FB monitor. The structure of the on-line complex is presented. The read-out electronics is described. Software general structure is given. The main DAS programs are considered. 7 refs.; 9 figs.

48207 **(ITEF—172-1985) Proton beam current measurement in the U-10 ionguide.** Zavodov, V.P.; Uvarov, A.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703305.

Three channels for measuring proton beam current in an ionguide were realized at ITEP proton synchrotron. Toroidal magnetoinduction current monitors (MIM) were used in the system. The system measures average current of charged particles flying through MIM during gate pulse duration. Each measurement cycle includes, in addition to main signal measurement, measurement of test signal from a current reference generator. Main MIM characteristics and basic circuits of a current-voltage converter and a calibration current pulse shaper are given. A computer performs normalization of content of register "Measurement" with respect to content of register "Calibration" which permits to reduce systematic errors of the measuring channel. 2 refs.; 3 figs.

48208 **(LA-UR—87-2653) Analysis of undulator field errors for XUV FELs [extreme ultraviolet free electron lasers].** Elliott, C.J.; McVey, B.D. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 26p. (CONF-8706192—1). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014734.

From Conference on undulator magnets for synchrotron radiation and free electron lasers; Trieste, Italy (23 Jun 1987).

This report discusses a number of magnetic field errors for extreme ultraviolet free electron lasers. Longitudinal coherence phase is one important parameter. For long undulators, beam wander is the important criterion; for segmented undulators with short segments, longitudinal coherence is the important criterion. An effective way to control files errors is shown to be segmentation of the undulator. Sample calculations are given. 10 refs., 13 figs., 1 tab. (JDH)

48209 **(LBL—23556) Use of permanent magnets in accelerator technology: Present and future.** Halbach, K. (Lawrence Berkeley Lab., CA (USA)). May 1987. Contract AC03-76SF00098. 20p. (CONF-870438—35). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014687.

From Spring meeting of the Materials Research Society; Anaheim, CA, USA (21 Apr 1987).

This report is a collection of viewgraphs discussing accelerator magnets. Permanent magnet systems have some generic properties that, under some circumstances, make them not only mildly preferable over electromagnets, but make it possible to do things that can not be done with any other technology. After a general discussion of these generic advantages, some specific permanent magnet systems will be described. Special emphasis will be placed on systems that have now, or are likely to have in the future, a significant impact on how some materials research is conducted. 4 refs., 33 figs.

48210 **(NIIEFA-P-E—0707) Synthesis of electromagnet pole configurations on the base of the solution of Cauchy problem for Laplace equation.** Kashikhin, V.S. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1985. 14p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703342.

Problem on electromagnet pole configuration synthesis according to the assisgned magnetic field distribution in the magnet central plane occurs, when designing electromagnets for charged particle accelerators. Methods for synthesis of electromagnet pole configurations according to the assigned magnetic field induction power series expansion are presented. To obtain the pole configuration, the Cauchy problem on Laplace equation is solved using computerized analytical transformation of power series expansion. Results of the charged particle accelerator dipole magnet pole profile calculations conducted using PROFMAG program and realizing the method described are presented. 10 references, 3 figures.

48211 **(NIIEFA-P-V—0680) Kilo ampere beam current electron source.** Vakhrushin, Yu.P.; Kolesov, N.I.; Mamykin, V.N. (Tsentral'nyj Nauchno-Issledovatel'skij Inst. Informatsii i Tekhniko-Ehkonomicheskikh Issledovanij po Atomnoj Nauke i Tekhnike, Moscow (USSR)). 1985. 9p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703343.

Structure is described and the main characteristics of pulse electron source (ES) with the beam energy of up to 1 MeV as well as the current peak value of up to 3 kA are presented. ES comprises three main units: casing and two pulse transformers, cathode and anode. Results of numerical simulation of beam shaping by the electron-optical ES system are presented. Experimental data on ES operation with a thermocathode in regimes, close to the calculated ones, are obtained. Bunching mode operation with 1 kHz frequency pulses in the bunch is foreseen. ES is used as injector of the updated linear induction accelerator (LIA) 5/5000. 11 references, 5 figures.

48212 **(SAND—87-1650) Predicted radiation environment of the Saturn baseline diode.** Halbleib, J.A.; Lee, J.R. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1987. Contract AC04-76DP00789. 94p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000259.

Coupled electron/photon Monte Carlo radiation transport was used to predict the radiation environment of the Saturn accelerator for the baseline diode design. The x-ray output has been calculated, as well as energy deposition in CaF_2 thermoluminescent dosimetry and silicon. It is found that the design criteria for the radiation environment will be met and that approximately 10 kJ of x rays will be available for simulation experiments, if the diode provides a nominal beam of 2.0-MeV electrons for 20 ns with a peak current of 12.5 MA. The penalty in dose and x-ray output for operating below the nominal energy in order to obtain a softer spectrum is quantified. The penalty for using excessive electron equilibration in the standard packaging of the thermoluminescent dosimeters is shown to be negligible. An intrinsic lack of electron equilibration for silicon elements of components and subsystems is verified for Saturn environments, demonstrating the ambiguity of design criteria based on silicon deposition. Validation of an efficient next-event-estimator method for predicting energy deposition in equilibrated detectors/dosimetry is confirmed. Finally, direct-electron depositions in excess of 1 kJ/g are shown to be easily achievable. 34 refs., 30 figs.

48213 **(UCID—21176) Operation in pulsed mode at RTNS-II.** Yamamoto Junji; Massoletti, D.J.; Heikkinen, D.W.; Sumita, Kenji. (Lawrence Livermore National Lab., CA (USA); Osaka Univ. (Japan)). Sep 1987. Contract W-7405-ENG-48. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000234.

An experiment was done with a D^+ ion source on a test stand, after which the pulsing system was installed on an RTNS-II neutron source to demonstrate its feasibility as an intense pulsed neutron source. The ion source MATS-II was run in the pulsed mode. A maximum current of 115 mA was obtained by arc pulsing, but with a pulse width of more than 200 msec. In the pulsed operation of RTNS-II, the beam was accelerated up to 360 keV and a maximum current of 80 mA was obtained on the rotating target. (LEW)

48214 **Polarization of antiprotons by antilambda decay.** Yokosawa, A. (Working Group Coordinator, Argonne National Laboratory, Argonne, Illinois 60439). *AIP (American Institute of Physics) Conference Proceedings;* **145**: No. 1, 221-225(20 Jul 1986). (CONF-8504161—).

From Workshop on polarized antiproton sources; Bodega Bay, CA, USA (18 Apr 1985).

Production of polarized antiproton beams at Fermilab from the parity violating decay of antilambdas is discussed. Use of polarimeters such as the Coulomb-Nuclear and the Primakoff-Effect polarimeters is also mentioned.

48215 **Preliminary lattice proposal for polarized beam acceleration in SSC.** Steffen, K. (DESY, Notkestrasse 85, Hamburg, Germany). *AIP (American Institute of Physics) Conference Proceedings;* **145**: No. 1, 154-161(20 Jul 1986). (CONF-8504161—).

From Workshop on polarized antiproton sources; Bodega Bay, CA, USA (18 Apr 1985).

Initial design for the Siberian Snake method of polarized beam acceleration in the Superconducting Super Collider is presented. A snake is an alternating sequence of horizontal and vertical bends designed to rotate the spin (of a particle beam) by 180 degrees about an axis that lies in the horizontal plane.

48216 **Spin depolarization of a polarized antiproton beam by electron cooling.** Anderson, L.W. (Department of Physics, University of Wisconsin, Madison, WI 53706). *AIP (American Institute of Physics) Conference Proceedings;* **145**: No. 1, 226-228(20 Jul 1986). (CONF-8504161—).

From Workshop on polarized antiproton sources; Bodega Bay, CA, USA (18 Apr 1985).

A polarized antiproton beam is depolarized by the random collisions with electrons that occur in electron cooling. An estimate for the depolarization rate is given.

48217 **Noninterceptive beam diagnostics.** Chamberlin, D.D. (AT-4, MS H821, Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **139**: No. 1, 37-44(25 Apr 1986). (CONF-8505164—).

From Workshop on high brightness, high current, high duty factor ion injectors; San Diego, CA, USA (21 May 1985).

The need for accurate real-time diagnostics is critical for high-power particle beams. This paper describes the present level of development of noninterceptive devices for these beams. Discussion will center on diagnostic measurements as they occur along the beamline, from ion-source to the input into an RFQ, and on measurements of the RFQ output, using the cw beam at Los Alamos as an example.

48218 **CW RFQ development.** Schriber, S.O. (AT-DO H811, Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **139**: No. 1, 17-24(25 Apr 1986). (CONF-8505164—).

From Workshop on high brightness, high current, high duty factor ion injectors; San Diego, CA, USA (21 May 1985).

A review of research and development related to fabricating and operating radio-frequency quadrupole (RFQ) structures at 100% duty cycle [continuous wave (cw)] is presented, with emphasis on work at the Los Alamos National Laboratory, the Chalk River Nuclear Laboratories, and the University of Frankfurt. Activities in other areas that have an impact on operating cw RFQ systems will be highlighted.

48219 **Funneling: An intial beam-dynamics study.** Guy, F.W.; Wangler, T.P. (AT-1, MS H817, Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **139**: No. 1, 185-192(25 Apr 1986). (CONF-8505164—).

From Workshop on high brightness, high current, high duty factor ion injectors; San Diego, CA, USA (21 May 1985).

Funneling two H^- beams into a single beam of twice the current has been examined as a means of doubling beam current without significantly increasing transverse emittance. Using the PARMILA particle-following code, two 100-mA RFQ output beams at 2 MeV were injected into idealized transport lines for merging two beams into one. Two approaches were studied: (1) the "minimum-element" method, in which a minimum number of discrete elements such as quadrupole triplets, buncher cavities, and bending magnets were used to transport and deflect the beam; and (2) the "quasi-adiabatic" method, in which a periodic lattice similar to the RFQ provided focusing and minimized abrupt changes in the beam environment. The minimum-element method resulted in an emittance growth ratio ϵ_0/ϵ/sub i/ = 2.5, whereas the quasi-adiabatic emittance growth ratio was about 1.1 (albeit with an idealized line configuration).

48220 **High-current beam transport with multiple beam arrays.** Kim, C.H. (Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *AIP (American Institute of Physics) Conference Proceedings;* **139**: No. 1, 63-78(25 Apr 1986). (CONF-8505164—). Contract AC03-76SF00098.

From Workshop on high brightness, high current, high duty factor ion injectors; San Diego, CA, USA (21 May 1985).

Highlights of recent experimental and theoretical research progress on the high current beam transport of single and multiple beams by the Heavy Ion Fusion Accelerator Research (HIFAR) group at the Lawrence Berkeley Laboratory (LBL) are presented. In the single beam transport experiment (SBTE), stability boundaries and the emittance growth of a space charge dominated beam in a long quadrupole transport channel were measured and compared with theory and computer simulations. Also, a multiple beam ion induction linac (MBE-4) is being constructed at LBL which will permit study of multiple beam transport arrays, and acceleration and bunch length compression of individually focused beamlets. Various design considerations of MBE-4 regarding scaling laws, nonlinear effects, misalignments, and transverse and longitudinal space charge effects are summarized. Some aspects of longitudinal beam dynamics including schemes to generate the accelerating voltage waveforms and to amplify beam current are also discussed.

48221 **Scheme to funnel ion beams with a radio-frequency quadrupole.** Stokes, R.H.; Minerbo, G.N. (MS H817, Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **139**: No. 1, 79-94(25 Apr 1986). (CONF-8505164—).

From Workshop on high brightness, high current, high duty factor ion injectors; San Diego, CA, USA (21 May 1985).

We describe a proposed method to funnel ion beams using a new form of the radio-frequency quadrupole (RFQ) structure. This RFQ accepts two bunched ion beams and combines them into a single final beam with interlaced microstructure pulses. It also provides uninterrupted periodic transverse focusing to facilitate the funneling of beams with high current and low emittance.

4304 Storage Rings

REFER ALSO TO CITATION(S) 48180, 48186, 48701

48222 (ANL-PHY—87-1, pp 89-99) **Physics with fast stored ions.** Poulsen, O. (Univ. of Aarhus, Denmark). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

A review of the Aarhus heavy ion storage ring project is given. Also, the planned experiments at this facility are discussed.

48223 (ANL-PHY—87-1, pp 163-182) **Heavy ion storage rings.** Schuch, R. (Oak Ridge National Lab., TN). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—). Contract AC05-84OR21400.

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

A brief overview of synchrotron storage rings for heavy ions, which are presently under construction in different accelerator laboratories is given. Ions ranging from protons up to uranium ions at MeV/nucleon energies will be injected into these rings using multiturn injection from the accelerators available or being built in these laboratories. After injection, it is planned to cool the phase space distribution of the ions by merging them with cold electron beams or laser beams, or by using stochastic cooling. Some atomic physics experiments planned for these rings are presented. 35 refs.

48224 **(IFVE-ORI—85-4) Spectral investigation of neutron radiation in three-sectional concrete labyrinth from a californium-252 source.** Belogorlov, E.A.; Britvich, G.I.; Getmanov, V.B. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 18p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703245.

Construction of labyrinths in points of communication output from the storage-ring under construction is accompanied by numerous difficulties due to a considerable number of gas and cryogenic pipelines, which require large cross sections at the minimal length of the pipelines proper for their location. It results in unfavourable for radiation attenuation ratios between cross section and length of the labyrinth separate sections. Neutron spectra in a model concrete labyrinth, at the entrance to which a neutron source with fission spectrum (californium-252) and the same source in a polyethylene moderator are located, are measured. On the basis of the spectra obtained the formation of fluence and equivalent dose along the labyrinth geometric axis is analyzed. Conditions permitting actually to reduce radiation dose in the labyrinth (dead end provision, the use of cover materials, construction of diaphragms and shielding plates) are simulated. 5 refs.; 18 figs.

48225 **(IFVE-OUNK—86-97) Higher mode oscillation damping system in the UNK accelerating unit.** Katalev, V.V.; Kudryavtsev, V.G.; Sulygin, I.I.; Shembel', B.K. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703266.

Submitted to the journal Zh. Tekh. Fiz. .

The main components and performances of higher mode damping system of the UNK accelerating unit are described. The system is developed taking into account the calculation topology of higher mode fields and requirements for their coupling impedances. Experimental results on higher mode damping in experimental module of the UNK accelerating system (AS) unit are presented. Each of AS resonator is equipped with dampers, one of which is installed on the bottom (the rejector one) and two others - on the shell (two radial ones). The rejector damper is a coaxial energy output from the resonator to the absorbing loading. The radial dampers contain only coaxial line. The investigations conducted have shown that the use of the system of three dampers in each AC unit resonator to decrease coupling impedances at higher modes to the threshold level in the frequency range 300-1500 MHz is quite possible. The degree of certain mode damping can be increased at the expense of selection of coupling probe size and shape, and the use of ferrite. 11 refs.; 6 figs.; 1 tab.

48226 **(IFVE-OUNK/ORI—86-58) Influence of heat release on superconducting dipole performance during UNK duty cycle.** Ageev, A.I.; Balbekov, V.I.; Dmitrevskij, Yu.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 20p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703267.

Determination of reasonable margin of current-carrying ability of the design ensuring reliable operation of the dipole under specific conditions of the accelerating-storage complex (UNK) may be determined when developing UNK superconducting dipoles. For this purpose a detailed analysis of temperature regime of DE type dipoles is carried out. Real conditions for UNK magnet operation, particularly: essential dynamic heat releases, irradiation, heat release in a vacuum chamber, heat inflows from environment and peculiarities of superconducting magnet cryostating system, were taken into account. The magnets permit to obtain the working filed of 5 T in the aperture without training, they display good mechanical stability and acceptable reproductivity of magnetic field quality. The peak field in the center of the apperture of this series of magnets makes up 6.2 T at the temperature of winding equal to 4.2 K. It is concluded that at the initial temperature of cryotatin equal to 4.4 K all the magnetic of the UNK cryogenic arm will operate under reliable conditions. Radiative heating of the winding under fast extraction system operation, emergency dump and localization of losses are most dangerous. Protection measures of suprconducting magnets developed for UNK permit to reduce this heating up to the acceptable level. 15 refs.; 15 figs.; 5 tabs.

48227 **(LA-UR—87-2766) Transverse collective instability in the PSR [Proton Storage Ring].** Neuffer, D.; Colton, E.; Swain, G.; Thiessen, H.; Blind, B.; Hardekopf, R.; Jason, A.; Lawrence, G.; Shafer, R.; Hardek, T. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 27p. (CONF-870260—14). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014772.

From International workshop hadron facility technology; Santa Fe, NM, USA (2 Feb 1987).

An instability in the Proton Storage Ring (PSR) is observed as fast loss of beam during accumulation and storage when the injected beam current exceeds a threshold value. Experimental study results of that instability are presented in this paper. The instability threshold depends significantly on rf voltage, injected momentum spread, PSR sextupole strengths, and also on ring octupole strengths. The results are consistent with the hypothesis that the instability is a transverse instability excited by a transverse impedance Z/sub perpendicular/ with norm of Z/sub perpendicular/≅ 1 MΩ/m. The driving impedance has significant magnitude in the 30 to 300-MHz frequency range. 6 refs., 10 figs., 3 tabs.

44 INSTRUMENTATION

4401 Radiation Instrumentation

REFER ALSO TO CITATION(S) 47243, 48390, 48393, 48394, 48470, 48695, 48749, 48763, 48990, 49146

48228 **(AD-A—182568/6/XAB) Development of a tissue-equivalent proportional-counter system for the measurement of neutron dose. Final report, 1986-1987.** Hilarides, R.J. (Naval Academy, Annapolis, MD). 19 May 1987. 65p. (USNA-TSPR—145). NTIS, PC A04/MF A01.

This paper describes a neutron-gamma dose-measurement system utilizing a Tissue Equivalent Proportional Counter (TEPC). A multi-channel analyzer acquires the data and sends it to a personal computer for analysis on a spreadsheet. The system yields information on lineal energy, absorbed dose, quality factor, and dose equivalent for different neutron-gamma sources. Results are presented that compare the response of the TEPC system to a thermoluminescent detector (TLD), neutron remmeter (AN/PDR-70), and a liquid scintillator (NE-213) with exposure to californium, plutonium-beryllium and 14-MeV neutron sources. Quality-factor comparisons are shown between the TEPC system, which measures lineal energy, to presently accepted quality factors, which are based on linear energy. The results of the project indicate that the TEPC should be given serious consideration for use as a shipboard area dosimeter.

48229 **(CEA-CONF—8873) Diogene: synthesis and perspectives.** L'hote, D. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service de Physique Nucleaire a Moyenne Energie). Nov 1986. 17p. (In French). (CEA-DPH-N-S—2401; CONF-8611138—3). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752608.

From Saturne workshop; La Londe-les-Maures, France (10 Nov 1986).

Characteristics of large solid angle Diogene detector set at Saturne are presented, together with its principal aim: heavy ion relativistic central collision physics. Some results of α + A reactions are given together with preliminary results of Ne + A experiments. The program will be continued with heavier projectiles.

48230 (DOE/ER/03130—36) The MicroVAX-based data acquisition system for D0. Cutts, D.; Hoftun, J.S.; McLean, J.; Johnson, C.R.; Zeller, R.T. (Brown Univ., Providence, RI (USA); Zeller Research Ltd., Cranston, RI (USA)). 1987. Contract AC02-76ER03130. 10p. (CONF-870552—25). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014475.

From 5. conference on real-time computer applications in nuclear, particle, and plasma physics; San Francisco, CA, USA (11 May 1987).

A large array of Micro VAX computers will be used for high-speed data acquisition and online filtering in the D0 experiment at Fermi National Laboratory. Described is this system, as well as several smaller data acquisition systems now operational, with particular emphasis on the control and communication software. The computers in this array will run under VAXELN.

48231 (EUR—10282) Software for a measuring facility for activation analysis. De Keyser, A.; De Roost, E. (Commission of the European Communities, Geel (Belgium). Central Bureau for Nuclear Measurements; Commission of the European Communities, Luxembourg). 1985. 90p. NTIS (US Sales Only), PC A05/MF A01. File Number DE87752558.

A software package has been developed for an APPLE P.C. The programs are intended to control an automated measuring station for photon activation analysis at GELINA, the linear accelerator of C.B.N.M. at Geel (Belgium). They allow to set-up a measuring scheme, to execute it under computer control, to accumulate and store 2 K-spectra using a built-in ADC and to output the results as listings, plots or evaluated reports.

48232 (EUR—10426) Calibration of the active well coincidence counter for cylindrical, high-enrichment uranium-aluminium fuel assemblies. Fraser, D.T.; Verrecchia, G.P.D.; Krick, M.S.; Menlove, H.O.; Canada, T.R.; Frederiksen, P.; Jorgensen, E. (Commission of the European Communities, Luxembourg). 1986. 44p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752556.

The Active Well Coincidence Counter has been calibrated for the verification of high-enrichment uranium-aluminium cylindrical fuel tubes and assemblies of the type used in the DR3 research reactor at Riso, Denmark. A special polyethylene insert was used to hold and irradiate the fuel for a two-position measurement. For coincidence counting, a single calibration curve is adequate for the verification of tubes and assemblies with 45% and 93% enrichment. The counting statistics error for a 600-s coincidence measurement is — 1% for assemblies and — 3% for tubes. The positioning error is — 1%. Total neutron counting is also useful for the rapid intercomparison of tubes or assemblies; the counting statistics error for a 60-s totals measurement is — 0.6% for assemblies and 1.5% for tubes.

48233 (IFVE-ONF—86-37) Charge-sensitive amplifier. Krasnokutskij, R.N.; Fedyakin, N.N.; Shuvalov, R.S. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703236.

Submitted to the journal Radio Eng. Electron. Phys. .

A charge-sensitive amplifier with slow (for amplitude measurement) and fast (for time measurement) output is considered. Expressions for signals at these outputs and for spectral densities of noise are obtained. It is shown that the requirement of equality of time constants for feedback and load does not practically effect on the shape of signals from the slow output but it results in occurrence of long tails of comparatively small amplitude in current pulses from the slow output. Formulae for cases of arbitrary impedances of the input circuit, feedback circuits and load are presented. The material is presented based on the principle of superposition. 19 refs.; 3 figs.

48234 (IFVE-ONF—86-173) System of gas Cherenkov counters for kaons identification in high intensity beams. Gorin, Yu.P.; Denisov, S.P.; Koryagin, A.S.; Lebedev, A.A.; Medved', S.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703241.

The design and characteristics of the threshold and differential Cherenkov counters to identify kaons in hadron beams with momentum up to 35 GeV/c and intensity up to 10/sup 7/ part/s are described. 2 refs.

48235 (IFVE-ONF—86-178) Sigma spectrometer for investigation of π/sup -/-meson dissociation in μ/sup +/μ/sup -/π/sup -/ system on nuclei. Antipov, Yu.M.; Batarin, V.A.; Bezzubov, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 19p. (In Russian). (SERP-E—148). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703242.

The on-line "Sigma" spectrometer aimed at investigating π/sup -/ meson dissociation in the μ/sup +/μ/sup -/π/sup -/ system during pion interaction with nuclei is constructed at the Institute of High Energy Physics. The spectrometer comprises a beam section, a target with the protective system, a magnetic spectrometer, a muon identifier, a system of control and data acquisition. The beam section of the spectrometer comprises scintillation counters, hodoscopes, proportional chambers and the Cherenkov gas counters. The HP2100 computer has been used for data reception and processing. The procedure of useful events selection has been described. In the experiment 1.15 x 10/sup 11/ beam π/sup -/ mesons have been passed through the spectrometer and 3x10/sup 6/ events have been recorded. 10 refs.; 8 figs.

48236 (IFVE-ORI—85-3) Methodical aspects of Bonner multisphere spectrometer application in radiation researches at the IHEP accelerator. Belogorlov, E.A.; Britvich, G.I.; Krupnyj, G.I.; Lukanin, V.S.; Rastsvetalov, Ya.N.; Kuznetsov, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 19p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703244.

A design and main parts of the Bonner spectrometer are described. Some peculiarities of scintillation and activation detectors used for thermal neutron detection inside spherical moderators are considered. The influence of holes inside moderators on response of thermal neutrons detector is investigated. The results of spectrometer calibration with californium-252 neurtron sourse are presented. The practical ways on using of the PENS reconstruction code are shown and, as an example, the final results on measurement of two various neutron spectra at the accelerator are presented. 22 refs.; 3 tabs.; 8 figs.

48237 (INIS-mf—10652) Investigation of the absorption and scattering behaviour of gamma radiation in fine grained hard coal and coal slurry due to the photo effect and Compton effect with regard to determining the ash and solid contents. Bachmann, C. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen). 24 May 1985. 98p. (In German). NTIS (US Sales Only), PC A05/MF A01. File Number DE87752462.

In the context of the development of a fast measuring equipment for the continuous on-line determination of the ash content of fine-grained hard coal or the ash and solid contents of flotation products, the absorption and scattering ability of γ radiation due to the photo effect and Compton effect was simulated by model calculations. The composition of the coal and the adjacent rock and the proportion of water were varied within wide limits, in order to characterize interference effects such as iron and water content. Good agreement was found with experimental results, so that the different methods of measurement can be described very well phe-

nomenologically, so that a deeper understanding of the method of operation is made possible by the usual backscattering method for a quick determination of the ash content. The most important result is that it is not the Compton effect, but the photo effect which decisively influences the result. Therefore, the backscattering method, which is based on the backscattering of Am and the transmission method, where the absorption of Am radiation is determined and in addition Cs measuring section is required for density compensation, are based on the same physical principle.

48238 (INIS-mf—10956, pp 45) **Extrapolation chamber with electrode spacing varied by remote control.** Du Preez, M.L. (Council for Scientific and Industrial Research, Pretoria, South Africa. National Physical Research Lab.). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48239 (INIS-mf—10956, pp 38) **Commissioning of a chair-type whole-body counter at Pelindaba.** De Beer, G.P.; Hollestein, M.; Botha, M.; Nel, D.; Joubert, J.C. (Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48240 (INIS-mf—10956, pp 38) **Necessity for multiple energy photon calibrations of radiation monitors.** Blain, A.P. (Council for Scientific and Industrial Research, Pretoria, South Africa. National Physical Research Lab.). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48241 (INIS-mf—10956, pp 35) **Dosimetry in mixed neutron-gamma fields: the neutron sensitivities of Geiger-Mueller counters.** Jones, D.T.L. (Council for Scientific and Industrial Research, Faure, South Africa. National Accelerator Centre). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48242 (INIS-SU—413, pp 25-29) **Calibration of scintillation detectors of the ANI installation.** Danilova, E.V.; Romakhin, V.A. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780003.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

To register extensive air showers (EAS) of cosmic rays it is supposed to use about 10/sup 3/ plastic scintillation detectors at the presently constructed "ANI" installation. To calibrate these detectors correlation between the most probable detector response to the particle non-collimated flux and the average detector response to the particle vertical flux from the cosmic ray background is measured. Data on the calibration conducted are quite suitable to determine EAS particle flux density with the accuracy of about 10%. 8 refs.; 2 figs.; 1 tab.

48243 (INIS-SU—415, pp 48-56) **Primary ionization measurement of relativistic particle in the RISK spectrometer streamer chamber.** Bannikov, A.V.; Boehm, J.; Vertogradov, L.S. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178. (N—18-86).

In JINR rapid communications. Collection.

Procedure of extracting the information on particle ionization losses from the data on track microstructure in the RISK spectrometer streamer chamber obtained using the AELT-2/160 automatic measuring system is described. The possibility of using average value of streamer diameter on a track measured directly on a film is proposed. It is used as a parameter making allowance for instabilities of streamer chamber systems and photographic material parameters. The difference is observed between ionization losses of 38 GeV/c π/sup -/-mesons and antiprotons which agrees with theoretical estimates. The accuracy achieved in the ionization measurement is near to the theoretical limit. 14 refs.; 4 figs.

48244 **(ITEF—97-1986) Streamer counter.** Vorob'ev, L.S.; Goryainov, N.A.; Kuznetsov, S.G.; Smirnitskij, A.V.; Shuvalov, S.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703279.

The design and specifications of gas-filled multiwire detectors utilized in a magnetic-free hadron spectrometer are described. The detectors represent a system of flat multiwire electrodes with 2 mm pitch of winding signal wires and 2 mm gas gap. The detector filled with "magic gas" (75% Ar+24.5% CuH/sub 10/+0.5% CF/sub 3/Br)+4% methylal operates in the "self-quenching" streamer regime and may be called "short-streamer counter". The signal from the counter after slight preamplification was supplied to standard channels of the magnetic-free hadron spectrometer electronics intended for operation with scintillation counters. 8 refs.; 5 figs.

48245 **(ITEF—98-1986) Lambdameter.** Vorob'ev, L.S.; Gavrilov, V.B.; Goryainov, N.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702943.

The electronic installation "Lambdameter" for detecting cumulative 40-150 MeV Λ particles in a relativistic charged particle beam (π-mesons and protons) is described. A technique of a nonmagnetic hadron spectrometer for detecting charged products of the Λ/sup 0/ -> pπ decay is used in the installation. The use of high-precision track detectors enables to identify outgoing protons and π-mesons and determine their energy and divergence angle. 3 refs.; 4 figs.

48246 **(ITEF—100-1986) Charged particle identification in an experiment with nuclear photoemulsion as a vertex detector.** Dubinina, A.I.; Smirnitskij, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703280.

Method of particle identification in an experiment with nuclear photoemulsion as a vertex detector by measuring ionization on charged particle tracks in emulsion layers and particle momentum in the bubble chamber, is described. Measuring charged particle ionization in the nuclear photoemulsion and momentum in the bubble chamber (or magnetic spectrometer) the particle mass may be identified. The results of control measurements are given. 9 refs.; 5 figs.; 1 tab.

48247 **(ITEF—106-1985) Fast charge-to-digital converter.** Popov, V.P.; Sokolova, O.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703281.

A charge-to-digital converter with conversion frequency up to 10 MHz and zero dead time is described. The memory size is 256 6-digit words. Indefiniteness of time-to-signal correlation does not exceed 10 ns. 1 ref.; 4 figs.

48248 **(ITEF—154-1986) On possibility of detection of double beta decay by liquid ionization chambers.** Barabash, A.S.; Bolozdynya, A.I.; Stekhanov, V.N. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 34p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703291.

Experimental set-up to study double beta-decay of all the most interesting isotopes with the sensitivity of — (3-9) x 10/sup 23/ years for 2β(OV)-decay and — (3-9) x 10/sup 21/ years for 2β(2V)-decay is described and its performances are presented. Detector is a multisection Ar or CH/sub 4/ liquid ionization chamber. The set-up is supposed to be located in the low-background underground laboratory. Background conditions are estimated. 58 refs.; 3 tabs.

48249 (ITEF—155-1986) Program for spectra unfolding using a mini computer. Bolotskij, V.P.; Breslavskij, O.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 27p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703293.

A program for analysis of complex nuclear spectra with overlapping peaks and bakground is described. The program is developed as a dialog and permits to determine the optimum values of parameters for description of experimental spectra and to calculate the area under the peaks. 8 refs.; 4 figs.; 4 tabs.

48250 (ITEF—159-1986) Error analysis during charged particle parameters measuring in the experiments with a xenon bubble chamber. 1. Main error sources. Instrumental errors. Avdeev, N.F.; Barylov, V.G.; Demidov, V.S.; Sokolov, M.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 24p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703295.

The paper is devouted to the analysis of estimation errors using stereoprojector of parameters of particle tracks in registed the xenon bubble chamber images. The main error sources, methods of selecting the error analytical dependencies on significant factors, being particle track lengths and depth angle modulus, are given. Coordinate measurement errors are presented. 14 refs.; 2 figs.; 2 tabs.

48251 (ITEF—161-1985) Adaptation of the GERA computer code for spatial reconstruction of events for the ES computer. Andryakov, A.D.; Vojtenko, I.D.; Mikhajlichenko, V.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703296.

The ES-version of the GERA computer code which has been developed for the reconstruction of spatial picture of events recorded in the bubble chamber placed in magnetic field and for the determination of geometric and kinematic parameters of tracks is described. A 3-4 times increase in fast response as compared with the BEhSM-6 version is the main advantage of the GERA. In the ES-version the possibility to process the events measured by the AIST type devices and the possibility of the program restart with the counting continued without a programmer are ensured. The way to start the program for counting, differences in control program cards and output database format are described. 8 refs.

48252 (ITEF—161-1986) Error analysis during charged particle parameters measuring in the experiments with a xenon bubble chamber. 2. Mathematic models for measurement errors of particle track geometrical parameters. Avdeev, N.F.; Barylov, V.G.; Demidov, V.S.; Nikitenko, A.N.; Sokolov, M.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 35p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703297.

Analytical dependences of measurement errors of particle track (lengths, angles) geometrical parameters on significant factors, that are particle track lengths and depth angle modulus, in a xenon bubble chamber are obtained. The values of correlation coefficients between parameters errors are presented. 2 refs.; 17 figs.; 4 tabs.

48253 (ITEF—162-1986) Wide-aperture installation for study on multiparticle reactions. Abramov, B.M.; Borodin, Yu.A.; Davletshin, R.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 47p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703298.

To investigate multiparticle reactions with barion exchange in πN interactions an installation based on ITEP 3 m magnetic spectrometer with optical spark chambers inside the magnet is designed. The main detecting elements of the event selection system are: high-pressure multichannel wide-aperture threshold Cherenkov counter, proportional chamber, scintillation counter hodoscope systems. The liquid hydrogen target is placed at the magnetic spectrometer inlet. The given spark chambers location permits to detect and perform momentum analysis of charged particles yielding from the target to the front hemisphere with a maximal solid angle. 12 refs; 16 figs.; 4 tabs.

48254 (ITEF—167-1985) Technique for track search for events recorded in the ITEP 6-meter spectrometer (MIS). Nozdrachev, V.N.; Sokolovskij, V.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 27p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703300.

An algorithm for track search in the 6-meter spectrometer with electrodynamic chambers uniformly distributed in an analyzing magnet field is described. The algorithm takes into account the chamber design features and operates reliably in a wide range of measured particle momenta (0.3-40 GeV/c) and chamber efficiency (60-100%). 4 refs.; 9 figs.

48255 (ITEF—168-1985) Technique for processing multivertex events with neutral strange particles detected in the ZhVK-205 liquid hydrogen chamber. Drutskoj, A.G.; Mikhajlichenko, V.I.; Nikitin, S.Ya. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703302.

A technique for determination of the particle kinematic parameters in multivertex events in the ZhVK-205 hydrogen bubble chamber is developed. The software designed tested on V/sup 0/-type fork permits to obtain correct particle parameters and their errors. 6 refs.; 6 figs.

48256 (ITEF—170-1985) Specific features for designing circuits for preliminary processing signals from the PSP-2 flying spot digitizer. Polikarpov, V.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703303.

The description of separate parts of the up-date counting channel of the PSP-2 (HPD) device is given. Modification of the PSP-2 for the double rate of scanning caused the worsening of signal-to-noise ratio at the output of a photorecording device. Conservation of 3 μm meansquare error required modification of the fsd channel. The device for processing track and reference signals has been developed on the basis of a delay line. Image processing with a wide range of densities and contrasts at the IHEP spectrometer became possible with the use of this device. 9 refs.; 11 figs.

48257 (JINR—13-86-730) Characteristics of a mini-drift chamber. Davydov, Yu.I.; Sergeev, S.V.; Strmen', P.; Feshchenko, A.A.; Flyagin, V.B.; Chirikov-Zorin, I.E.; Shpalek, J. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems). 1986. 7p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703313.

Submitted to the journal Nucl. Instrum. Meth. .

Characteristics of the drift chamber with a 3 mm drift gap have been investigated in a particle flux of 10 GeV/c momentum. The chamber has a good linearity of drift characteristics, high accuracy and works reliably in a particle flux of — 3 x 10/sup 5/ s/

sup -1/ x cm/sup -2/. Spatial resolution of — 45 μm in the centre of the drift gap is achieved. 10 refs.; 7 figs.

48258 **(JINR-R—1-86-669) Methods of high-resolution holography and optical analysis of particle tracks in track detectors by the radiation of partial coherence. Partial-coherent holographic detection of tracks of a high transverse resolution.** Bykovskij, Yu.A.; Zarubin, A.M.; Larkin, A.I.; Markilov, A.A.; Starikov, S.A.; Rusakov, V.A.; Samsonov, V.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy; Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1986. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703319.

Submitted to the journal Instrum. Exp. Tech.

The method of partial-coherent Fourier holography has been suggested and studied to register particle tracks in track detectors (bubble and streamer chambers). The method makes it possible to increase the depth of an image on the space plane to the size of the detector operating volume keeping a transverse resolution within the diffraction limit, to decrease the effect of optical medium nonhomogeneities in the operating volume and to provide a high contrast of an image. In addition, the method allows one to combine the schemes of operational scanning and image processing with standard equipment. Experimental results of the detection of a standard object and a model of tracks (fine glass fibres) are presented. A resolution of 8 μm is limited by the objectie aperture of the scheme of reconstruction of partial coherent Fourier holograms. 35 references, 4 figures.

48259 **(LA—11014-MS) Improvement of a portable pressurized ionization chamber with the addition of a microprocessor datalogger.** Van Etten, D.; Olsen, B. (Los Alamos National Lab., NM (USA)). Jul 1987. Contract W-7405-ENG-36. 19p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014706.

A measurement system was necessary to monitor low-level external radiation levels along a boundary section of the Los Alamos National Laboratory. High pressure ionization chambers were selected to monitor the radiation levels caused by a plume of air activation products generated by a linear proton accelerator. The data are used for evaluation of an atmospheric dispersion model and for boundary dose calculations. The model compares the pressure ionization chamber (PIC) data with the predicted values based on meteorological wind data measured by two meteorological towers and source term data from the discharge stack. The PIC monitoring system required continuous remote (no ac power) battery-only operation, reliability, and data processing capability. The data processing capability simplified calibration and provided fine time resolution for comparison with other logged data. The sensor head of a Reuter-Stokes RSS-111 was used as the detector and an improved electronic control package was developed to operate the detector and to process and log the data.

48260 **(LA-UR—87-2370) Cineradiography.** Lucero, J.P.; Zerwekh, W.D. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 6p. (CONF-8708110—13). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013158.

From 31. SPIE annual international technical symposium on optical and optoelectronic applied science and engineering; San Diego, CA, USA (16 Aug 1987).

This paper describes a cineradiography system in use at the Los Alamos National Laboratory, as related to the advantages and disadvantages over conventional flash x-ray systems. Traditionally, x-ray imaging techniques in dynamic testing have relied on creating extremely short pulses of radiation to freeze the motion of the object, and then recording the image on film by means of fluorescent intensifying screens to obtain sufficient image density on the film. This results in images often limited only by the resolution of the film-screen combination, which are usually of reasonable quality. In a cineradiography system, two basic differences are evident. First, the radiation source emits continuously for the duration of the experiment. Second, the film is replaced by a gated, intensified television camera focused on the fluorescent screen. The image is frozen by the short gate time of the camera, rather than by the short pulse of radiation. One advantage of the television system is that the camera can be considerably distant from the screen, and if the screen is sacrificial, mechanical protection requirements are alleviated or eliminated. Another advantage is that several cameras can be focused on the same screen, allowing multiple images to be made with the same geometry. A third advantage is that the spot size of the radiation source is small, thus reducing geometrical limitations on resolution. The disadvantages of this system relate to the use of the television camera to record the image(s). Neither the resolution nor the contrast of the intensified television camera is as good as film, and this limits the quality of the image that can be produced. However, flash radiographs are often of relatively poor quality because of the limited amount of radiation available from the source and the graininess of the high-speed film required, so this is often not an important difference. 9 figs., 1 tab.

48261 **(LA-UR—87-2853) Conceptual design of a high-resolution $\pi 0$ spectrometer.** Bowman, J.D. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 22p. (CONF-870158—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014757.

From Workshop on proton and neutral meson physics at intermediate energies; Los Alamos, NM, USA (8 Jan 1987).

This paper discusses the design of a high-resolution π^0 spectrometer based on accurate measurements of the opening angle between the two γ rays from π^0 decay. The first π^0 spectrometer of this type was built at LAMPF and first operated in 1978. It has an energy resolution of 2 MeV and solid angle of about 1 msr. During the last 10 years a considerable body of work studying the π-nucleus and π-nucleon charge-exchange reaction has been carried out. Many experiments that are being proposed and considered require a more capable instrument. During the same period there has been substantial improvement in the technologies of photon calorimetry and charged particle vertex resolution. These improvements make possible a ten-fold improvement in the energy resolution of a π^0 spectrometer. It is also possible to achieve large improvements in solid-angle and rate capabilities. This paper reviews and develops the physical principles involved in the design of an opening angle π^0 spectrometer. It is also shown that these principles, combined with the goals of good energy resolution, large-solid angle, and high-rate capability, constrain the design of a practical instrument.

48262 (N—87-24247, pp vp) **Gamma ray transients.** Cline, T.L. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The discovery of cosmic gamma ray bursts was made with systems designed at Los Alamos Laboratory for the detection of nuclear explosions beyond the atmosphere. HELIOS-2 was the first gamma ray burst instrument launched; its initial results in 1976, seemed to deepen the mystery around gamma ray transients. Interplanetary spacecraft data were reviewed in terms of explaining the behavior and source of the transients.

48263 **(OUP—87-06) PC board photometer controller.** Sten, T.A. (Oslo Univ. (Norway). Fysisk Inst.). 1987. 27p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752527.

The 4-S/D meridian scanning photometer (MSP) reffered to in this report was originally built at the Uppsala Ionospheric Observatory, Uppsala, Sweden. After several years of reliable operation at the Norwegian Institute of Cosmic Physics, Oslo from 1969, the electronics was completely re-designed in 1985, using a CDP 1802 microprocessor and a FP1100 CASIO personal computer (PC) for control and data acquisition. The MSP was then set into operation at the Polish Academy of Science's Polar Station at Hornsund, Spitzbergen. This system was again changed in 1986 as described in the following, providing a greater flexibility and data-handling capacity. The new MSP controller (based on a PC board) is easier to build, utilizing the microprocessor and the direct memory acess controller of the PC.

48264 **(RI—180) Stable current amplifying cascade.** Sheremet'ev, A.K. (Tsentral'nyj Nauchno-Issledovatel'skij Inst. Informatsii i Tekhniko-Ehkonomicheskikh Issledovanij po Atomnoj Nauke i Tekhnike, Moscow (USSR)). 1985. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703345.

Main characteristics of a current amplifying cascade are considered. It is shown that stability of the current amplification factor can be raised by means of the increase of intercascade equivalent resistance. A new structure of current amplifying cascade is proposed. The resultant temperature instability of the current amplification factor is 10^{-5} per degree. 5 references, 2 figures.

48265 **(RI—184) Calculation of solids angles for the elliptical source-rectangular detector system.** Nazarov, I.A.; Shigaev, O.E. (Radievyj Inst., Leningrad (USSR)). 1985. 7p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703346.

Accurate knowledge of a solid angle for a detector-radiation source system is of a great importance during absolute measurements of nuclear reaction cross sections and total radioactivity of radiation sources. The calculations of solid angle for a non-coplanar system elliptic source - rectangular detector are considered. Such configurations of sources and detectors are typical for nuclear physics experiments with charged particle beams using solid track detectors. Mathematical formulae and a FORTRAN 4 computer code are given. 6 references.

48266 **(SIS—1987:5) Harsaw atlas TLD reading-off equipment to CaF/sub 2/:Dy TL-dosemeters, and an annealing procedure for CaF/sub 2/:Dy TL-dosemeters.** Unhjem, J.F. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1987. 17p. (In Norwegian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752521.

Results of variation in reference light, dark current, TL-signal and total backgroud signal during a read-out series of CaF/sub 2/:Dy (TLD-200) crystals are presented. Also two annealing procedures are compared. The results indicated a good signal-to-noise ratio, $E(S)/\sigma$, and that a new annealing precedure might as well be used as the standard procedure.

48267 **(SLAC-PUB—4371) The Mark III vertex chamber.** Adler, J.; Bolton, T.; Bunnell, K.; Cassell, R.; Cheu, E.; Freese, T.; Grab, C.; Mazaheri, G.; Mir, R.; Odian, A. (California Inst. of Tech., Pasadena (USA); California Univ., Santa Cruz (USA); Illinois Univ., Urbana (USA); Stanford Linear Accelerator Center, Menlo Park, CA (USA); Washington Univ., Seattle (USA)). Jul 1987. Contract AC03-76SF00515;AC03-81ER40050;AC02-76ER01195. 7p. (CONF-870632—2). NTIS, PC A02. File Number DE87014316.

From International Europhysics conference on high energy physics; Uppsala, Sweden (25 Jun 1987).

The design and construction of the new Mark III vertex chamber is described. Initial tests with cosmic rays prove the ability of track reconstruction and yield triplet resolutions below 50 μm at 3 atm using argon/ethane (50:50). Also performed are studies using a prototype of a pressurized wire vertex chamber with 8 mm diameter straw geometry. Spatial resolution of 35mm was obtained using dimethyl ether (DME) at 1 atm and 30 μm using argon/ethane (50/50 mixture) at 4 atm. Preliminary studies indicate the DME to adversely affect such materials as aluminized Mylar and Delrin.

48268 **(SLAC-PUB—4373) The Mark III vertex chamber and prototype test results.** Grab, C. (Stanford Linear Accelerator Center, Menlo Park, CA (USA)). Jul 1987. Contract AC03-76SF00515;AC02-76ER01195;AC03-81ER40050. 2p. (CONF-870632—3). NTIS, PC A02. File Number DE87014606.

From International Europhysics conference on high energy physics; Uppsala, Sweden (25 Jun 1987).

A vertex chamber has been constructed for use in the Mark III experiment. The chamber is positioned inside the current main drift chamber and will be used to trigger data collection, to aid in vertex reconstruction, and to improve the momentum resolution. This paper discusses the chamber's construction and performance and tests of the prototype.

48269 (ZfK—590, pp 85-86) **Radiation detector for HLPC.** Heise, K.H. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48270 (ZfK—590, pp 86-87) **Software extension of the VKA 4995 multichannel analyzer.** Thieme, K. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48271 (ZfK—590, pp 87) **Installation of the SAMPO 80 code for spectral analysis on the ES 1055 computer.** Thieme, K.; Vinel, G. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48272 **Beta spectroscopy with liquid scintillation systems: applications in dosimetry of ^{90}Sr and ^{90}Y.** Mishra, A.C.; Parks, N.J. (California Univ., Davis, USA. Lab. for Energy-Related Health Research). *Applied Radiation and Isotopes;* **38**: No. 6, 455-461(1987). Contract AC03-76SF00472.

We have demonstrated that commercially available liquid scintillation counters are adequate for obtaining useful information about the variation of beta spectral shapes as a function of attenuation. A gel scintillation system that permitted the approximation of point source geometry worked well. The spectral shapes predicted by the Fermi equations were reasonably matched with experimental spectra of sources with geometry close to a point source. For energies in the range of 50-2300 keV, we found sufficient linearity of the energy scale and uniformity of detection limits for the direct output of the instrument to be experimentally useful. The gel scintillation system has been used to directly measure the energy distribution of the beta flux coming out of bone samples and incident on the soft tissue of dogs fed ^{90}Sr-^{90}Y from in utero to 540 days of age.

48273 **Optical readout method for solid state dosemeters.** McDonald, J.C.; Eichner, F.N.; Stahl, K.A.; Miller, S.D. (Pacific Northwest Lab., Richland, WA). *Radiation Protection Dosimetry;* **17**: No. 1-4, 329-331(1986). (CONF-860806—).

From 8. international conference on solid state dosimetry; Oxford, UK (26 Aug 1986).

The readout of solid state dosemeters is usually accomplished by heating to produce thermoluminescence. This technique has several disadvantages including stressing the dosemeter crystals, melting Teflon enclosures, and destroying the thin dosemeters designed for beta particle measurements. An optical readout method is being developed to avoid these difficulties. Standard dosemeters were irradiated to a dose of approximately 0.02 Sv with ^{137}Cs gamma rays. The dosemeters were then irradiated with light produced by a high intensity xenon lamp. Various wavelength bands, from the ultraviolet through the visible and to the near infrared, were used. The degree of trap emptying was found to be proportional to the total optical power incident. With the intensities used in the preliminary experiment, over 90% trap emptying was achieved. This new technique will prove useful for dosemeters that are encased in plastic for automatic processing. The details of this optical readout method, along with some possible applications in neutron and beta dosimetry are described.

4402 Radiation Effects On Instrument Components, Instruments, Or Electronic Systems

48274 **(IFVE-ONF—86-136) Radiation resistance of γ-detector modules at the labelling station of labelled neutrino complex.** Pishchal'nikov, Yu.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703239.

The data on efficiency and transparency decrease of various types of lightpipe-spectrum (LSS) and scintillation plates on the

basis of PMMA and polystyrene under the dose irradiation ranging from 10/sup 4/ to 3x10/sup 6/ rad have been obtained. Sample irradiation was carried out in a wide muon beam and with the intensive radioactie source /sup 60/Co. The deterioration in the γ-detector (TNF) energy resolution due to the radiation damage of scintillators and (LSS) is discussed. Radiation damage of the lead glass detectors (the GAMS detector) and "sandwich" type modules have been compared. 18 refs.; 6 figs.

4403 Miscellaneous Instruments

REFER ALSO TO CITATION(S) 47139, 47425, 47811, 47942, 48356, 49057

48275 (AD-A—182211/3/XAB) Pulsed-field-gradient nuclear magnetic resonance spectrometer for direct measurement of ionic diffusion in solid electrolytes. Final report, 1 January 1985-31 December 1986. Whitmore, D.H. (Northwestern Univ., Evanston, IL (USA)). 24 Apr 1987. 4p. NTIS, PC A02/MF A01.

A pulsed-field-gradient nuclear magnetic resonance spectrometer was successfully constructed, which is based on a superconducting magnet and has magic-angle spinning capabilities. A dewar facility is an integral part of this system so as to permit investigation of ionic diffusion down to 77 K, along with a sample heating arrangement for diffusion measurements up to 300 C. This spectrometer has been employed in the measurements of protonic diffusion coefficients in beta-alumina solid electrolytes and cation, anion, and self-diffusion coefficients and amorphous polymeric electrolytes.

48276 (BDX—613-3808) Quad RF power meter. Stone, D.W. (Allied Corp., Kansas City, MO (USA). Bendix Kansas City Div.). Sep 1987. Contract AC04-76DP00613. 11p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000135.

This report shows how to construct a four-channel RF power meter from circuit boards and components found in a Hewlett Packard Model 432A Power Meter. Included are descriptions of necessary modifications, electrical circuit diagrams, and a parts list. Each of the four power meters is compatible with a Hewlett Packard 432A Power Meter.

48277 (BDX—613-3809) Power ratio/attenuation dc substitution measurement uncertainty with a modified Hewlett Packard 432A Power Meter and 478A thermistor mount. Stone, D.W. (Allied Corp., Kansas City, MO (USA). Bendix Kansas City Div.). Sep 1987. Contract AC04-76DP00613. 22p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000134.

The instrumentation accuracy of a modified Hewlett Packard Model 432A Power Meter was evaluated. A 478A Thermistor Mount, a dc signal combiner, and two dc digital voltmeters were also used in developing a method to determine the dc substitution uncertainties associated with power ratio/attenuation measurements.

48278 (DOE/ER/13347—1) [The development of a new and novel Hadamard transform infrared spectrometer for analytical chemistry]: Progress report, May 15, 1985-now. (Kansas State Univ., Manhattan (USA)). [1987]. Contract FG02-85ER13347. 11p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014804.

This report summarizes the research accomplished under this grant in the areas of: VO_2 Hadamard masks; Hadamard transform spectrometer construction; computer software for Hadamard to Fourier transformation; and photoacoustic spectrometry. A listing of papers and chapters resulting from this research is also provided. (FI)

48279 (EUR—10234) Deuterium lamps as transfer standards for spectral radiance measurements. Key, P.J.; Nettleton, D.H. (Commission of the European Communities, Luxembourg). 1985. 69p. NTIS (US Sales Only), PC A04/MF A01. File Number DE87752557.

This report describes the work carried out at NPL and PTB to improve the performance of a low pressure deuterium discharge lamp, so that it can be used as a transfer standard in the spectral range 120 to 350 nm. To this end it was necessary: to replace the original quartz windows by magnesium fluoride single crystal plates, which were cut perpendicular to the c-axis of the crystal and which had to be free of impurities, to construct the lamps in that way that the directional uniformity of the emitted radiation is within the demands, to age the lamps and to preselect only those of which the irradiance was stable within +- 1% during a thirty minute period after warm-up, to improve the commercially available electrical power supply to meet the operational needs of the lamps. Thus, the deuterium lamps drifted by about 3% over a period of 100 h at all wavelengths except at 250 nm, where the ageing increased to 4.5%. A liquid nitrogen trap has been developed which can be installed between the vacuum system and the lamp. This reduced to about 2% the decrease of the window's transmission during the first hour of operation, caused by the deposition of oil from the vacuum system.

48280 (FMPC—2077) Laser diffraction particle size analysis of powders. Hilbert, R.H.; Volesky, A.F. (Westinghouse Materials Co. of Ohio, Cincinnati (USA). Feed Materials Production Center). Oct 1987. Contract AC05-86OR21600. 20p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000243.

A Malvern Instruments Particle Sizer 3600Ec was purchased and used to determine the particle volume distribution for six reference materials and three process samples. These results were acceptable with respect to the accuracy and precision of the instrument, as well as the accuracy of our analytical technique. The instrument is currently employed as the sole means of determining sub-sieve particle size distributions for powders submitted to this laboratory. 1 ref., 5 figs., 5 tabs.

48281 (INIS-SU—418, pp 44-46) Experimental study of the neutron monochromators on the basis of multi-layer interference structure. Antonov, A.V.; Isakov, A.I.; Mikerov, V.I.; Saposhnikov, N.P.; Tukarev, V.A. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

In Plasma physics. Collection.

Results of studying one- and two-crystal schemes of neutron monochromators on the basis of multi-layer interference structures are presented. With neutron monochromatization at Λ—10 A, resolution 25% in one-crystal scheme is 25%, and in two-crystal scheme - 17%. The obtained resolution values agree with those calculated. 3 refs.; 3 figs.; 1 tab.

48282 (ITEF—90-1986) Unit of programmed delay. Semenov, A.L. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 13p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703277.

A unit of programmed delay designed for utilization in measuring equipment of the physical experiment is described. The minimum value of delay is 50 μs, the pitch of delay is equal to 6.6 ns, accuracy of delay is not worse than 2.0 ns, input-output delay makes up 30 ns. 4 refs.; 4 figs.; 1 tab.

48283 (LA-UR—87-2712) Characterization of new focus projection and scan (FPS) vidicons for scientific imaging applications. Yates, G.J.; Jaramillo, S.A. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 11p. (CONF-8708110—10). NTIS, PC A02. File Number DE87014728.

From 31. SPIE annual international technical symposium on optical and optoelectronic applied science and engineering; San Diego, CA, USA (16 Aug 1987).

Several new photoconductors now commercially available as targets in Type 7803 Focus Projection and Scan (FPS) electrostatically focused vidicons have been characterized for use as radiometric sensors in transient illumination and single frame applications. These include Saticon (Se + As + Te), Newvicon (ZnSe), Pasecon (CdSe), and Plumbicon (PbO). Samples from several domestic and foreign manufacturers have been evaluated for photoconduc-

tive response time and responsivity at selected narrow wavelength bands, including 410 nm, 560 nm, and 822 nm. These data are compared with performance data from older target materials including Sb_2S_3 and silicon. The effect of bias lighting on sensitivity and transfer curve slopes for single-event pulsed light stimulas are presented. Dynamic range and saturation limits as functions of beam aperture, target voltage, and filament current are also discussed. 6 refs., 17 figs., 3 tabs.

48284 **(LA-UR—87-2837) Design of a transuranic VUV spectrometer.** Arko, A.J. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 8p. (CONF-870610—11). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014761.

From 5. national synchrotron radiation instrumentation conference; Madison, WI, USA (21 Jun 1987).

Most of our present knowledge about the physics of 5f systems derives from studies of uranium and its compounds. This is particularly true in the case of photoemission measurements where the intense radioactivity has prevented studies at synchrotron sources. The development of a transuranic VUV spectrometer capable of safe operation at a synchrotron source would represent a giant step in 5f research. This paper describes the conceptual design of such a spectrometer.

48285 (N—87-24266, pp vp) **Using SIRTF to study extragalactic star formation.** Wright, E.L. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

SIRTF, the Space Infrared Telescope Facility, is a NASA mission to provide a long lifetime, sensitive and flexible infrared observatory in space. SIRTF will be able to study selected objects with a sensitivity over 5,000 time better than the IRAS survey limits, and will provide photometric and low to medium resolution spectroscopic data over almost nine octaves from 1.8 to 700 micron wavelength. The baseline SIRTF design has an 85 cm telescope with optics and control system designed for diffraction limited operation at 4 micron and longer wavelengths. SIRTF will be able to measure important cooling lines from neutral regions, such as the 157 micron line, and lines from H II regions such as the 88 micron line. SIRTF will also be able to survey small areas of the sky to the confusion limit in the 3 to 700 micron region.

48286 **(N—87-24378) Detector arrays for low-background space infrared astronomy.** Mccreight, C.R.; Mckelvey, M.E.; Goebel, J.H.; Anderson, G.M.; Lee, J.H. (National Aeronautics and Space Administration, Moffett Field, CA (USA). Ames Research Center). Sep 1986. 13p. (NASA-TM—88344; NAS—1.15:88344; CONF-860880—56). NTIS, PC A02/MF A01.

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

The status of development and characterization tests of integrated infrared detector array technology for astronomy applications is described. The devices under development include intrinsic, extrinsic silicon, and extrinsic germanium detectors, with hybrid silicon multiplexers. Laboratory test results and successful astronomy imagery have established the usefulness of integrated arrays in low-background astronomy applications.

48287 **(NIIAR—34(680)) Study on the statistical accuracy of large-displacement pneumatic gages.** Zagumennov, Yu.G.; Aleksandrov, K.A. (Tsentral'nyj Nauchno-Issledovatel'skij Inst. Informatsii i Tekhniko-Ehkonomicheskikh Issledovanij po Atomnoj Nauke i Tekhnike, Moscow (USSR)). 1985. 18p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703340.

The statistical accuracy of pneumatic gages with the spiral scales and pulsed operation has been studied. The necessity for maintaining constant the gap between the measuring nozzle and scale has been shown. The methods for measuring the nozzle flow-rate coefficient has been presented. 3 references, 10 figures.

48288 **(OUP—87-09) Fully computerized multi-pass Fabry-Perot interferometer for Rayleigh-Brillouin scattering experiments.** Bohidar, H.; Berland, T.; Boger, F.; Joessang, T.; Feder, J. (Oslo Univ. (Norway). Fysisk Inst.). 1987. 78p. NTIS (US Sales Only), PC A05/MF A01. File Number DE87752531.

The development of a Multipass Fabry-Perot interforometer assembly for use in Rayleigh-Brillouin scattering experiments is reported. The optical alignment and the scattered signal data acquisition have been completely computerized. Digital scanning and alignment strategies of the Fabry-Perot resonator have been incorporated, which makes this instrument quite unique in this respect. The high contrast (—10/sup 10/) and finesse (—50) offered by this instrument makes it possible to detect Brillouin peaks from samples that have a small Brillouin scattering cross-section. As part of this system a compatible and precision sample chamber has been constructed, which has been designed to operate in the pressure and temperature ranges of 1-1000B and 20-150/sup o/C, respectively. The cell has been constructed to be small and compact, but it still has a large heat capacity (—250J/K) which ensures easy and stable temperature control of the liquid sample volume which has a size of 40 mm/sup 3/. The achievable temperature stability is +-1mK and +-2mK for operating temperatures below and above 100/sup o/C, respectively. The pressure stability is in the range of +-0.05B of the set pressure for pressures below 100B and it is +-0.05% for higher pressures up to 1000B. Both pressure and temperature are remotely monitored and controlled by a ND/100 computer. Special care has been taken in designing the optics of the pressure cell to ensure that both the primary and secondary reflections from the entrance window, as well as the main beam, go out of the scattering region in order to achieve higher signal-to-noise ratio in actual experiments.

48289 **(SAND—87-0043) A tutorial on Rogowski coil theory and operation.** McClenahan, C.R. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1987. Contract AC04-76DP00789. 35p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000006.

Without rigorously deriving all the equations that describe Rogowski coils, this memorandum describes how Rogowski coils work and why a Rogowski coil detects the charge passing through its toroidal opening yet remains insensitive to the details of the charge distribution. Rogowski coils sense the time derivative of the current (dI/dt), and produce a proportional output. Nevertheless, an experimenter, usually, wants to measure the current. Often, a passive integrator used with a Rogowski coil can provide an output signal proportional to the current passing through the toroidal opening in the Rogowski coil. In order to illustrate the use of Rogowski coils and integrators, this memorandum derives the equation for calculating the sensitivity of a Rogowski coil, and it compares the calculated and measured sensitivities of an actual Rogowski coil: The calculated sensitivity of 84 +- 13 mV-ms/kA agrees well with the measured sensitivity of 81 +- 2 mV-ms/kA. The integrator constructed for and used with the Rogowski coil described here has a measured time constant of 102 +- 4 ms. Therefore, to determine the current passing through the toroidal opening in the Rogowski coil, the experimenter multiplies the voltage at the output of the integrator by 1.26 +- 0.06 kA/mV.

48290 **(UCID—21137) Evaluation system for crystal streak cameras.** Steele, D.L.; Jelsma, L.F. (Lawrence Livermore National Lab., CA (USA)). 24 Aug 1987. Contract W-7405-ENG-48. 6p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000238.

We have developed a system for evaluating light-steering crystals for crystal streak cameras. This report describes our system and presents a layout of the design of a streak camera for the 1- to 4-μm region of the optical spectrum. 2 figs., 1 tab.

48291 **(UCRL—95349) Hydrogen chloride measurements in launch-vehicle exhaust clouds.** McRae, T.; Kennedy, R.; Garvis, D.; Smith, M.D. (Lawrence Livermore National Lab., CA (USA); Air Force Engineering and Services Center, Tyndall AFB, FL (USA)). May 1987. Contract W-7405-ENG-48. 15p. (CONF-870584—12). NTIS, PC A02/MF A01; GPO Dep. File Number DE87011552.

From Society of Photo-Optical Instrumentation Engineers conference; Orlando, FL, USA (17 May 1987).

An Air Force-sponsored effort to develop a versatile field sensor for the measurement of hydrogen chloride (HCl) vapors from rocket launches is described. Lawrence Livermore National Laboratory (LLNL) is developing an infrared HCl detector with ppB range sensitivities to be used for monitoring HCl during space vehicle launches at Vandenberg AFB. HCl deposition on the community neighboring Vandenberg AFB can involve costly litigation. Monitoring is necessary to determine the amount of HCl and if it presents hazardous situations or detrimental effects. The sensor developed by LLNL is an "in situ" sampler, which can constantly monitor a rapidly changing concentration of HCl in air (response time is one second). It is a four-band differential absorption instrument, allowing for corrections due to system electronic and optical variations, as well as for variations in the background concentrations of methane and water vapor that also absorb at HCl wavelengths. There is also the possibility of measuring HCl droplets with this type of sensor. The detector's variable pathlength-absorption region allows for HCl detection down to 200 ppB. The instrument is remotely operable, a necessity given the rugged Vandenberg terrain and limitations placed on personnel access to the launch area. The data from the battery-powered sensor are transmitted via radio link to a central base station where they are displayed and recorded using an IBM PC. 9 refs., 15 figs., 3 tabs.

48292 **(UCRL—96280) Progress toward a crystal streak camera using tungsten bronze crystals for the electrooptic material.** Jelsma, L.F.; Lowry, M.E.; Neurgaonkar, R.R.; Cory, W.K.; Welch, H.W. (Lawrence Livermore National Lab., CA (USA); Rockwell International Corp., Thousand Oaks, CA (USA). Science Center; Arizona State Univ., Tempe (USA). Dept. of Electrical and Computer Engineering). 1 Jul 1987. Contract W-7405-ENG-48. 6p. (CONF-8708110—12). NTIS, PC A02. File Number DE87013110.

From 31. SPIE annual international technical symposium on optical and optoelectronic applied science and engineering; San Diego, CA, USA (16 Aug 1987).

Currently, the Hamamatsu and Sandia Corporations use lithium niobate ($LiNbO_3$) in their crystal streak cameras. However, these systems have low resolution due to the low electrooptic coefficient of $LiNbO_3$, 30 x 10^{-12}, which requires excessive voltage drives for the system. For a practical system, new tungsten bronze crystals such as barium niobate [Sr/sub 1-x/Ba/sub x/Nb_2O_6, or SBN:1-x (%) for short] must be used to achieve higher resolution and lower voltage drive requirements. Electrooptic coefficients of 400 x 10^{-12} m/V for SBN:60 and 1400 x 10^{-12} m/V for SBN:75 give improvements in resolution of 13 and 47, respectively. In this paper, we discuss the highlights of a light deflector developed at Lawrence Livermore National Laboratory (LLNL) for a streak camera that uses tungsten bronze crystals grown at Rockwell International Science Center. We address the design and fabrication of these crystals and include experimental results from our deflector experiment, the purpose of which is to determine the feasibility and expected performance of the crystal streak camera using tungsten bronze crystals. 9 refs., 4 figs., 3 tabs.

48293 **(WINCO—11354) Diagnostics aid for mass spectrometer trouble-shooting.** Filby, E.E.; Rankin, R.A.; Webb, G.W. (Westinghouse Idaho Nuclear Co., Inc., Idaho Falls (USA)). 1987. Contract AC07-84ID12435. 11p. (CONF-8708136—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000350.

From Artificial intelligence and other innovative computer applications in the nuclear industry; Sun Valley, ID, USA (31 Aug 1987).

The "MS Expert" system provides problem diagnostics for instruments used in the Mass Spectrometry Laboratory (MSL). The most critical results generated on these mass spectrometers are the uranium concentration and isotopic content data used for process control and materials accountability at the Idaho Chemical Processing Plant. The two purposes of the system are: (1) to minimize instrument downtime and thereby provide the best possible support to the Plant, and (2) to improve long-term data quality. This system combines the knowledge of several experts on mass spectrometry to provide a diagnostic tool, and can make these skills avilable on a more timely basis. It integrates code written in the Pascal language with a knowledge base entered into a commercial expert system "shell." The user performs some preliminary status checks, and then selects from among several broad diagnostic categories. These initial steps provide input to the rule base. The overall analysis provides the user with a set of possible solutions to the observed problems, graded as to their probabilities. Besides the trouble-shooting benefits expected from this system, it will also provide structures diagnostic training for lab personnel. In addition, development of the system knowledge base has already produced a better understanding of instrument behavior. Two key findings are that a good user interface is necessary for full acceptance of the tool, and a development system should include standard programming capabilities as well as the expert system shell. 22 refs., 5 figs.

48294 **Accelerator mass spectrometry for measurement of long-lived radioisotopes.** Elmore, D.; Phillips, F.M. (Argonne National Lab., IL). *Science (Washington, D.C.);* **236**: 543-550(1 May 1987). Contract W-31-109-ENG-38.

Particle accelerators, such as those built for research in nuclear physics, can also be used together with magnetic and electrostatic mass analyzers to measure rare isotopes at very low abundance ratios. All molecular ions can be eliminated when accelerated to energies of millions of electron volts. Some atomic isobars can be eliminated with the use of negative ions; others can be separated at high energies by measuring their rate of energy loss in a detector. The long-lived radioisotopes ^{10}Be, ^{14}C, ^{26}Al, ^{36}Cl, and ^{129}I can now be measured in small natural samples having isotopic abundances in the range 10^{-12} to 10^{-15} and as few as 10^5 atoms. In the past few years, research applications of accelerator mass spectrometry have been concentrated in the earth sciences (climatology, cosmochemistry, environmental chemistry, geochronology, glaciology, hydrology, igneous petrogenesis, minerals exploration, sedimentology, and volcanology), in anthropology and archaeology (radiocarbon dating), and in physics (searches for exotic particles and measurement of half-lives). In addition, accelerator mass spectrometry may become an important tool for the materials and biological sciences. 98 references, 4 figures, 2 tables.

48295 **The performance of CCD array detectors for application in high-resolution tomography.** Kinney, J.H.; Johnson, Q.C.; Bonse, U.; Nusshardt, R.; Nichols, M.C. (Lawrence Livermore National Lab., Livermore, CA 94550). pp 43-50 of X-ray imaging II. Knight, L.V.; Bowen, D.K. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1986). (CONF-860880—).

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

Charge coupled device arrays (CCDs) with low noise, small pixel size and high charge storage capacity are available at relatively low cost. Because of this, CCDs are finding increasing use in imaging applications. In this paper the authors discuss the performance of a TI-4849 CCD array in an x-ray camera to be used for high-resolution synchrotron radiation tomography. The x-ray image is converted to visible light on a phosphor coated optical face plate which is imaged by a thermoelectrically cooled CCD. The measured modulation transfer function (high-contrast MTF) is presented for this system. Procedures for choosing and preparing the optimal phosphors for x-ray imaging are described. Advantages and limitations of CC arrays over other detectors for tomographic applications are also described.

48296 **An undulator based scanning microscope at the National Synchrotron Light Source.** Rarback, H.; Shu, D.; Ade, H.; Jacobsen, C.; Kirz, J.; McNulty, I.; Rosser, R. (National Synchrotron Light Source, Brookhaven National Lab., Upton, NY 11973). pp 107-110 of X-ray imaging II. Knight, L.V.; Bowen, D.K. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1986). (CONF-860880—).

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

A second generation scanning soft x-ray microscope is under construction, designed to utilize the dramatic increase in source brightness available at the soft x-ray undulator. The new instrument is expected to reduce image acquisition time by a factor of about 100, and to improve resolution, stability, and reproducibility.

45 EXPLOSIONS AND EXPLOSIVES

4501 Chemical

REFER ALSO TO CITATION(S) 49229

48297 **(SAND—87-0041C) An analytical-experimental comparison of 150 and 220 grain per foot linear shaped charge performance.** Robinson, A.C.; Vigil, M.G. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 8p. (CONF-8710148—1). NTIS, PC A02/MF A01; GPO Dep. File Number DE87014217.

From 10. international symposium on ballistics; San Diego, CA, USA (28 Oct 1987).

Experimental data on the jet characteristics and penetration performance of four 150 and four 220 grain per foot linear shaped charges are presented. The predictions from an analytical code developed to model the three dimensional collapse, jetting and penetration process of linear shaped charges compare favorably with the experimental data. 7 refs., 9 figs., 2 tabs.

48298 **(SAND—87-2301C) Stemming column phenomenology.** Smith, C.W. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 8p. (CONF-870961—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014847.

From 4. symposium on containment of underground nuclear explosions; Colorado Springs, CO, USA (21 Sep 1987).

Cliff Olsen (LLNL) has reported measurements of unusual stress-time behavior in the stemming column of a nuclear event. Following the dynamic stress peak, he sees a second stress peak whose amplitude sometimes exceeds the dynamic pulse. We have seen a similar phenomena in grouted drill holes which stem 64-lb high explosive events. Although we have not explained the phenomena, we offer the following hypothesis. The stemming materials responds differently than the host material to the unloading and rebound dynamics that occur with the formation of the residual stress field. We challenge the calculation community to model and predict this phenomena, for understanding it may lead to potentially useful stemming techniques. 2 refs., 2 figs.

48299 **(SAND—87-2302C) Junior Jade events: An investigation of decoupling phenomenology.** Smith, C.W. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 15p. (CONF-870961—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014848.

From 4. symposium on containment of underground nuclear explosions; Colorado Springs, CO, USA (21 Sep 1987).

With five 8-pound high-explosive events, we have explored aspects of the containment phenomenology of partially decoupled events. Three events drove multiple fractures and showed little cavity growth, suggesting that the fracture propagation was part of the dynamic process. Two events were contained; their cavity volumes grew by factors of approximately two and three with the tighter-coupled event showing the larger growth. With the five events we see a spectrum of results ranging from hydrofrac type fracture propagation through multiple fracture propagation to the fully contained case. For the multiple fracture case a partial residual stress field may control the release of the cavity pressure. Measurements of cavity pressure versus time provides a valuable diagnostic of containment. 2 refs., 7 figs., 1 tab.

48300 **Measurement of pyrotechnic ignition energy by thermography.** Mohler, J.H.; Abney, L.D.; Chow, T.S. (Monsanto Research Corp., Mound, Miamisburg, OH). pp 27-30 of An international conference on thermal infrared sensing for diagnostics and control (Thermosense VIII). Kaplan, H. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1986). (CONF-8509181—).

From 8. thermosense conference; Cambridge, MA, USA (16 Sep 1985).

Measuring the laser energy required to ignite pyrotechnic pellets is complicated by several factors that are difficult to control or predict. These include reflection of part of the incident laser energy, reemission from the heated sample, and heat conduction away from the ignition site. In addition to these factors, it is often difficult to control and/or measure the incident laser power. High-speed thermographic recording of the temperature distribution in the test sample makes it possible to calculate the heat content of the test pellet at any instant. Thus, one can actually observe the laser heating and on-set of reaction in the pellet and avoid having to make measurements or assumptions to account for possible energy losses.

4502 Nuclear

REFER ALSO TO CITATION(S) 47368, 47796, 48298, 48404

48301 **(AD-A—182501/7/XAB) Global-effects simulation studies. Interim report (Final), April 1985-November 1986.** Bauer, E.; Albini, F.A.; Chandler, C. (Institute for Defense Analyses, Alexandria, VA (USA)). Nov 1986. 76p. (IDA-M—199). NTIS, PC A05/MF A01.

This document reviews the initial rise of a fire plume in the atmosphere, including effects of the condensation of entrained moisture. The condensation, expansion, and evaporation of the water cloud are examined, as are the relative effects of scattering and absorption in radiation transport through the gray-white smoke plume and a wood fire. For applications to the Nuclear Winter problem, the following points are made as recommendations for further work in critical areas: 1. The climatic impact of a smoke plume depends significantly on its height in the atmosphere, which is affected by long-term atmospheric motions and in particular by solar-induced buoyancy as well as by initial plume rise. This long-term behavior can be studied by using Artic-Haze data. 2. For a given optical thickness, the absorptive (black, sooty) component of smoke (due largely to oil and oil-related fuels) is much more effective in reducing the transmission of sunlight and thus in producing climatic cooling than is the largely scattering (white-gray) component which predominates in most wood fires. The smoke characteristics tend to change with time, and thus for climatic application should be investigated as late as possible after injection into the atmosphere. This in turn, requires using smoke from the largest possible sources which can be studied for the longest times.

48302 **(AD-A—182785/6/XAB) Nuclear winter: the continuing debate. Student essay.** Nida, A.V. (Army War Coll., Carlisle Barracks, PA (USA)). 23 Mar 1987. 27p. NTIS, PC A03/MF A01.

This essay examines the debate over the climatic consequences of global nuclear war as related in the so-called Nuclear Winter hypothesis. This review examines the major components of the theory and traces development of the scientific knowledge leading to a second phase of the controversy two years after the first hypothesis. The conclusions of the essay are that the original nuclear winter findings have been altered by later scientific study and, therefore, the political conclusions drawn by Carl Sagan in 1983 can no longer be supported by theory or facts. Continued use of the Crutzen-Birks (Ambio, 1982) and TTAPS (Science, December 1983) studies worst-case evidence from NCAR (Foreign Affairs, Summer 86) represents selective science. Arguing for strategic policy changes based on nuclear winter risks constitutes anti-nuclear rhetoric and not scientific reasoning.

48303 **(CONF-870961—Absts.) Fourth symposium on containment of underground nuclear explosions: Abstracts.** (Lawrence Livermore National Lab., CA (USA)). 1987. Contract W-7405-ENG-48. 29p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000059.

From 4. symposium on containment of underground nuclear explosions; Colorado Springs, CO, USA (21 Sep 1987).

The symposium was intended to be a meeting of workers at all levels in the containment community. Presentations and discussion on containment and related geological, geophysical, engineering, chemical, and computational topics are included.

48304 **(CONF-871101—42) Nuclear Winter: The implications for civil defense.** Chester, C.V.; Perry, A.M.; Hobbs, B.F. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 7p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87012524.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

"Nuclear Winter" is the term given to hypothesized cooling in the northern hemisphere following a nuclear war due to injection of smoke from burning cities into the atmosphere. The voluminous literature on this subject produced since the original paper in 1983 by Turco, Toon, Ackerman, Pollack, and Sagen (TTAPS) has been reviewed. The widespread use of 3-dimensional global circulation models have resulted in reduced estimates of cooling; 15 to 25°C for a summer war and a few degrees for a winter war. More serious may be the possibility of suppression of convective precipitation by the altered temperature profiles in the atmosphere. However, very large uncertainties remain in input parameters, the models, and the results of calculations. We believe the state of knowledge about nuclear winter is sufficiently developed to conclude: Neither cold nor drought are likely to be direct threats to human survival for populations with the wherewithal to survive normal January temperatures; The principal threat from nuclear winter is to food production, and could present problems to third parties without food reserves; and Loss of a crop year is neither a new nor unexpected threat from nuclear war to the US and the Soviet Union. Both have at least a year's food reserve at all times. Both face formidable organizational problems in distributing their reserves in a war-damaged environment. The consequences of nuclear winter could be expected to fall more heavily on the Soviet Union than the US due to its higher latitude and less productive agriculture. This may be especially true if disturbances of rainfall amounts and distribution persist for more than a year. 6 refs.

48305 **(LA—11060-MS) Electromagnetic Pulse (EMP) from surface bursts.** Murphy, T. (Lawrence Livermore National Lab., CA (USA)). Aug 1987. Contract W-7405-ENG-36. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014700.

We present a simple analytic model to estimate the electromagnetic pulse (EMP) produced by the asymmetric Compton current distribution coming from a nuclear explosion on or near the earth's surface. The model does not include the effect of return currents in the air and ground and so is most appropriate for high-frequency EMP. It can be used to calculate the signal seen at a remote observation point at any angle above the surface of the earth. We find that the high-frequency signal from this effect is comparable with or larger than the geomagnetic turning signal from a surface burst and must therefore be considered in attempting to interpret existing EMP data.

48306 **(UCID—21129) ARGX-87: Accident Response Group Exercise, 1987: A Broken Arrow mini exercise.** Schuld, E.P.; Cruff, D.F. (Lawrence Livermore National Lab., CA (USA)). Jul 1987. Contract W-7405-ENG-48. 22p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000239.

A Broken Arrow mini exercise dubbed "Accident Response Group Exercise - 1987" (ARGX-87) was conducted on June 1, 1987 at the Lawrence Livermore National Laboratory (LLNL) and Sandia National Laboratories, Livermore (SNLL). The exercise started at 0445 PDT with a call from the Department of Energy (DOE) - EOC in Washington, DC, to the Albuquerque Operations (AL -) - EOC. AL, in turn, called the Laboratory off-hour emergency number (Fire Dispatcher), who called the Laboratory Emergency Duty Officer (LEDO). The LEDO then contacted the Accident Response Group (ARG) Senior Scientific Advisor. Calls were placed to assemble appropriate members of the ARG in the ALERT Center. No phone number for SNLL was available at the Albuquerque Operations EOC, so a controller injected a message to SNLL to get them involved in the exercise. The messages received at the Laboratory identified the Air Force line item weapon system involved in the accident and the accident location. As people arrived at the ALERT Center they began discussing the details of the accident. They also started working the deployment logistics and other issues. Travel arrangements for the HOT SPOT equipment and ARG personnel were made for immediate deployment to the accident site in North Dakota. The exercise was terminated at 0840 as planned. While certain procedural deficiencies were noted, the exercise was considered a valuable learning experience. The results and observations from this experience will be used to refine the operating procedures and the training program.

48307 (UCRL—50025-87-1, pp 1-21) **Simulated and rocket-triggered lightning testing of the Lightning-Invulnerable Device System (LIDS).** Hasbrouck, R.T. Apr 1987. NTIS, PC A04/MF A01. File Number DE87009361.

In Electronics Engineering Department EE technical review.

Because the accidental detonation of a nuclear-explosive test device at the Nevada Test Site (NTS) would be unacceptable, a lightning-invulnerable device system (LIDS) for protection from lightning has been developed. Using high-energy storage capacitor bands, simulated lightning transients were generated and input to a prototype LIDS canister. In this program, a small rocket carried a grounded wire into a highly electrified cloud, causing the prototype LIDS canister to be struck by actual lightning. Results indicated that the LIDS provided an extremely effective way to prevent threat-level lightning transients from reaching the safety-critical components within the canister. The LIDS system is described.

48308 (UCRL—50025-87-1, pp 34-41) **Fiber-Optic, Analog, Transmission System (FATS).** Hagans, K.G. Apr 1987. NTIS, PC A04/MF A01. File Number DE87009361.

In Electronics Engineering Department EE technical review.

The FATS is used to record analog signals from underground nuclear tests (UGT). During a UGT, an electrical signal from a diagnostic detector in the vicinity of the nuclear device directly modulates a semiconductor injection laser diode to produce an optical signal, which travels through a 1-km-long fiber-optic cable to a streak-camera recorder on the surface. The system's performance in a recent UGT at the Nevada Test Site (NTS) is described and an update of LLNL plans for developing future systems is given.

48309 **Risk analysis of terrorist attacks.** Martz, H.F.; Johnson, M.E. (Los Alamos National Lab., NM). *Risk Analysis;* 7: No. 1, 35-47(Mar 1987).

A quantitative probabilistic/systems analysis model is described which is useful for allocating resources to safeguard valuable documents or materials in either a fixed-site facility or a moving convoy against an overt terrorist attack. The model is also useful for ranking the sensitive areas at a site according to their survivability of a given hypothesized terrorist attempt. To compare various defense strategies and security configurations, the probability of a successful terrorist activity is computed based on event tree models of the site/security configuration. This calculation incorporates a realistic engagement model (in the event a guard force engages the terrorists prior to completion of their objective) and information on barrier penetration times (for example, distribution of the time to defeat a chain link fence or vault door, traverse, an open area, and so forth). Two security analyses are described to illustrate the methodology. One example considers a terrorist attack on a convoy transporting a missile from a storage to a launch facility. The second example involves an attack on a munitions storage facility.

4503 Explosion Detection

REFER ALSO TO CITATION(S) 47802, 48151

48310 (AD-A—182030/7/XAB) Source depths utilizing broad-band data. Final report, 11 April 1985-28 February 1987. Sutton, G.H.; Carter, J.A.; Barstow, N. (Rondout Associates, Inc., Stone Ridge, NY (USA)). 19 Mar 1987. 109p. NTIS, PC A06/MF A01.

This report covers the effort of a two-year research project to improve the ability to discriminate between nuclear explosions and earthquakes based, on the depth of an event determined from local and regional phases. The approach taken was to provide phase identification and picking abilities for depth phases pp and sp through adaptive filtering to reduce effects of mode conversion and scattering. Three-component polarization methods are applied to broad-band digital data from a set of earthquakes located in the northeastern United States and from the short period records of the Ocean Sub-bottom Seismometer (OSS) for events in the Kuril/Kamchatka area. Data from the northeast U.S. are compared with suites of synthetic seismograms for different depths and focal mechanisms obtained using two velocity/attenuation models appropriate for northeastern United States and Canada. This comparison provides a basis for identification of the depth phases and discrimination of other reflected/refracted arrivals in the P wavetrain. Polarization state filtering (following procedures proposed by Samson) is used to emphasize those frequencies exhibiting the desired particle motion within a time that slides through the P wavetrain.

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC

REFER ALSO TO CITATION(S) 47933

5001 Basic Studies

REFER ALSO TO CITATION(S) 48378, 48543, 49213

48311 (AD-A—182406/9/XAB) Heavy ozone in the stratosphere. Bates, D.R. (Queen's Univ., Belfast, Northern Ireland (UK). Dept. of Applied Mathematics and Theoretical Physics). Jul 1986. 4p. NTIS, PC A02/MF A01.

Pub. in Geophysical Research Letters, Vol. 13, No. 7, 664-666(Jul 1986).

On taking account of the symmetry numbers involved it is found that the rate coefficient of the ter-molecular association process giving heavy ozone is greater than that of the corresponding process giving regular ozone(Ozone48). It is suggested that this is the explanation of the Ozone50 enhancement observed in the stratosphere.

48312 (PNL—6279-Vol.2) Hanford Meteorological Station computer codes: Volume 2, The PROD computer code. Andrews, G.L.; Buck, J.W. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1987. Contract AC06-76RL01830. 33p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014807.

At the end of each work shift (day, swing, and graveyard), the Hanford Meteorological Station (HMS), operated by Pacific Northwest Laboratory, issues a forecast of the 200-ft-level wind speed and direction and the weather for use at B Plant and PUREX. These forecasts are called production forecasts. The PROD computer code is used to archive these production forecasts and apply quality assurance checks to the forecasts. The code accesses an input file, which contains the previous forecast's date and shift number, and an output file, which contains the production forecasts for the current month. A data entry form consisting of 20 fields is included in the program. The fields must be filled in by the user. The information entered is appended to the current production monthly forecast file, which provides an archive for the production forecasts. This volume describes the implementation and operation of the PROD computer code at the HMS.

5002 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 47025, 47054, 47066, 47356, 47582, 47586, 47705, 48125, 48159, 48431, 48524, 48530, 48532

48313 (BNL—40195) Compilation and analysis of air quality data in support of acid deposition research: Progress report. Benkovitz, C.M. (Brookhaven National Lab., Upton, NY (USA)). Sep 1986. Contract AC02-76CH00016. 34p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014428.

The objective was the compilation and initial analysis of a prototype unified data base of "current" aerometric data needed in support of acid deposition research. State agencies were contacted and pertinent information on station locations, parameters measured, methods used, etc., on their air quality obtained. A prototype data base was designed to include air quality observations from the States of New York, New Jersey and Pennsylvania covering the time period 1977 to present.

48314 (CEGB-TPRD-L—3019-R86) Development of an HCl laser system to measure plume HCl concentrations. Fernando, R. (Central Electricity Research Labs., Leatherhead (UK)). Aug 1986. 23p. Central Electricity Generating Board.

HCl released in the flue gas of a coal-fired power station can make a major contribution to acidity in precipitation, particularly in the near field. Ground level HCl measurements downwind of the stack are important for estimating how quickly HCl is removed from the atmosphere and in assessing possible ecological effects. The development in the laboratory of a system based on a chemical laser to measure HCl concentrations in power station plumes is described. The detailed construction of the laser, the high voltage discharge unit, the detection system and pyrex high-vacuum calibration system are described.

48315 (CONF-870937—1) An intensive short-term study of atmospheric lead deposition to a high-elevation spruce forest. Petty, W.H.; Lindberg, S.E. (Grinnell Coll., IA (USA); Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 4p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87007014.

From 6. international conference on heavy metals in the environment; New Orleans, LA, USA (15 Sep 1987).

The results of an intensive one-month study of all atmospheric lead deposition processes to a high-elevation red spruce (Picea rubens) forest in the southern Appalachian Mountains are reported. Wet deposition of Pb made up 46% of the total 390 $\mu g/m^2$/month influx to the forest canopy. Dry deposition contributed 49% and cloud water contributed 4% of the total. (ACR)

48316 (DOE/EH—0053-Vol.1) The environmental survey manual. (USDOE Assistant Secretary for Environment, Safety, and Health, Washington, DC. Office of Environmental Audit). Aug 1987. 157p. NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE88000253.

The purpose of this manual is to provide guidance to the Survey and Sampling and Analysis teams that conduct the one-time Environmental Survey of the major US Department of Energy (DOE) operating facilities. This manual includes a discussion of DOE's policy on environmental issues, a review of statutory guidance as it applies to the Survey, the procedures and protocols to be used by the Survey teams, criteria for the use of the Survey teams in evaluating existing environmental data for the Survey effort, generic technical checklists used in every Survey, health and safety guidelines for the personnel conducting the Survey, including the identification of potential hazards, prescribed protective equipment, and emergency procedures, the required formats for the Survey reports, guidance on identifying environmental problems that need immediate attention by the Operations Office responsible for the particular facility, and procedures and protocols for the conduct of sampling and analysis.

48317 **(DOE/ER/60405—2) The photophysics and chemistry of PAH [polycyclic aromatic hydrocarbons] compounds: Research progress report, September 1, 1985 to August 31, 1987.** Geacintov, N.E. (New York Univ., NY (USA). Radiation and Solid State Lab.). 1987. Contract FG02-86ER60405. 88p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87014455.

Research progress is reported in the following areas: (1) photoemission from particulate matter suspended in a gaseous atmosphere; (2) model heterogeneous chemical reactions - PAH/atomic oxygen; (3) electrochemistry at solid PAH/aqueous electrolyte interfaces; (4) energy transfer mechanisms in organic crystals; and (5) biological damage by PAH and nitro-PAH compounds: interactions with DNA. (ACR)

48318 **(DOE/ER/60592—2) Variation of workplace atmospheres.** Cohen, B.S. (New York Univ., NY (USA). Inst. of Environmental Medicine). 1987. Contract FG02-87ER60592. 20p. (CONF-870791—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013659.

From Annual health physics summer school; Pocatello, ID, USA (12 Jul 1987).

The assessment of exposure to airborne contaminants in the workplace requires recognition of the variability of workplace atmospheres. Measurements made to estimate inhalation exposure should be as near to the worker's nose or mouth as feasible. The measurements may be affected by factors such as resuspension of dust from work clothing and other surfaces and steep concentration gradients. The variability introduced by these fluctuating sources will add to the variability associated with the sampling system. It is important to understand the factors which may result in artifacts in exposure assessments and to exercise professional judgement when interpreting measurements of the concentration of airborne contaminants to which a worker is exposed.

48319 **(DOE/ER/60592—3) Design of a sampling program.** Cohen, B.S. (New York Univ., NY (USA). Inst. of Environmental Medicine). 1987. Contract FG02-87ER60592. 24p. (CONF-870791—3). NTIS, PC A02. File Number DE87013660.

From Annual health physics summer school; Pocatello, ID, USA (12 Jul 1987).

The design of a sampling program must be based on professional judgement and scientific methodology. When the reason for undertaking a program is clear, a preliminary survey will provide the input needed for specific sampling decisions. Decision criteria must be established to evaluate sampling results. A statistical approach is necessary if inferences are to be drawn from sampling data. In order to relate sampling data to health effects, it is important to obtain a representative sample, and to sample the significant fraction of an airborne contaminant. The interpretation of sampling results requires professional judgement and awareness of the limitations of current equipment.

48320 **(EUR—10644-EN) Air quality standard for SO_2 and particles (Directive 80-779-EEC) and its significance for the other main air pollutants.** (Commission of the European Communities, Brussels (Belgium)). 1986. 221p. Commission of the European Communities, Brussels (Belgium).

The paper describes the study and its aims as follows: ,to compile information on limit and guide values set out in industrialized countries and to identify those combined ones; to review relevant literature on combined effects of the pollutants NO_2, SO_2 and O_3 and particulate matter on human health and the environment; to derive the combined non-adverse effects levels with pollutant concentration measured in ambient air; to compare the combined non-adverse effects levels with pollutant concentration in ambient air; and to advise the Commission how the findings of the study could be incorporated into the air pollution abatement policy.

48321 **(EUR—10645-EN) Methods of sampling and analysis for sulphur dioxide, oxides of nitrogen and particulate matter in the exhaust gases of large combustion plants.** Brieda, F.; Bull, K.; Buehne, K.W.; Callais, M.; Menard, T.; Wallin, S.C.; Woodfield, M.J. (Warren Spring Lab., Stevenage (UK)). 1986. 156p. Commission of the European Communities.

This study was made in connection with the continuous emission monitoring requirements of the proposed EEC directive COM(80)704 Final, 15 December 1983. Relevant existing and planned legislation in Member states is outlined. Continuous measurement methods for SO_2, NO/sub x/ and particulate and discontinuous methods are described and discussed. In addition, measurement methods for oxygen, carbon dioxide, volume flow, temperature, humidity and pressure are considered, including the data treatment and equipment required. The methods used in each member state and the relevant national guidelines are tabulated. The costs of continuous measurement and data treatment devices are estimated.

48322 **(IVL-B—824) Nitrogen oxides and related compounds in North Europe. Atmospheric processes, deposition, monitoring and trends.** Grennfelt, P. (Swedish Environmental Research Inst., Goeteborg). May 1986. 18p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753353.

Emissions of nitrogen oxides in Europe are causing transboundary problem with respect to acid deposition as well as for the production of photochemical oxidants. Nitrate concentrations in precipitation over north Europe has doubled since the fifties although the upward trend seems to have broken during the last decade. Nitrate contributes today as a mean for north Europe to 30-40 percent of the acidity in rain. High concentrations of photochemical oxidants are frequently observed as a regional problem, where precursors emitted in one country may cause high concentrations in other countries. Although todays knowledge does not allow us to obtain accurate quantifications of the transboundary fluxes of NOsub(x), oxidants and oxidant precursors, existing results clearly show that oxidized nitrogen compounds and oxidants are international air pollution problems which need to be handled through international agreements. (authors).

48323 **(KTM/E-D—129) Removal of nitrogen oxides from flue gases.** Hiltunen, M.; Manula, T. (Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto). 1987. 64p. (In Finnish). NTIS (US Sales Only), PC A04. File Number DE87753343.

The objective of the project was to develop a commercial method for achieving a NO/sub x/ emission level of 30 ppm in fluidized bed combustion. Direct ammonia injection and catalytic reduction with ammonia were chosen as the methods to be tested. It was noticed in pilot scale tests at the Hans Ahlstroem Laboratory that NO/sub x/ emission could be reduced by adding ammonia into the upper part of the circulating fludised bed reactor. The NO/sub x/ level of 30 ppm was achieved in a few one-hour test periods. Selective, thermal reduction of nitrogen oxides as well as catalytic reduction with ammonia with various TiO/sub 2/, Al/sub 2/O/sub 3/ and Fe/sub 2/O/sub 3/ based catalysts were studied in laboratory tests at Helsinki University of Technology. The active components were Cu, Cr, Fe, Ni and V. Also the catalytic effects of some ferric slags and ore concentrates on NO/sub x/ reduction were determined as a function of temperature. The thermal conversion of NO/sub x/ could be improved by increasing the NH/sub 3//NO/sub x/ ratio. However, the ammonia emissions of the outcoming gas increased at the same time. The reaction rate of catalytic NO/sub x/ reduction was independent of the O/sub 2/ content of the flue gas when O/sub 2/ was above 1%. The optimum temperature of the reduction reaction was between 300 and 400 deg C. The V/TiO/sub 2/ catalyst endures the influence of SO/sub 2/ without losing its catalytic activity in the temperatures of 250-350 deg C. SO/sub 2/ raised the optimum temperature of NO/sub x/ reduction on Al/sub 2/O/sub 3/ based catalysts. When the base NO/sub x/ of the flue gas declined below 100 ppm, the catalytic reduction of NO/sub x/ decreased significantly.

48324 **(LBL—22153, pp 3.10-3.14) Volatile organic contaminants in indoor air.** Hodgson, A.T.; Girman, J.R.; Sokol, H.A.; Allen, J.R. May 1987. NTIS, PC A03/MF A01. File Number DE87013959.

In Applied Science Division Indoor Environment Program: Annual report, FY 1986.

The goal of this research is to understand relationships between airborne organic pollutant compounds in large buildings and energy conservation issues. Specific objectives are: (1) to develop appropriate methodology for identifying and quantifying organic

contaminants in non-industrial indoor air; (2) to study the relationships among the emissions of organic compounds, building material usage, and building-related factors such as ventilation; (3) to develop a model based upon emission rates and building characteristics to predict organic contaminant concentrations in buildings; and (4) to verify this model with field measurements. This research has targeted one class of organic compounds known to include irritants and carcinogens and shown by previous work in the laboratory to be emitted from widely-used building materials, i.e., the volatile organic compounds (VOC). 7 references, 1 figure, 1 table.

48325 (LBL—22153, pp 3.15-3.23) **Indoor exposure assessment.** Traynor, G.W.; Nero, A.V.; McCann, J.; Brown, S.R.; Aceti, J.C.; Apte, M.A.; Froehlich, D.A.; Horn, L.; Saegebarth, E; Sokol, H.A. May 1987. NTIS, PC A03/MF A01. File Number DE87013959.

In Applied Science Division Indoor Environment Program: Annual report, FY 1986.

The Indoor Exposure Assessment Group (IEAG) is part of the Lawrence Berkeley Laboratory's Indoor Environment Program. The research within the IEAG during FY 1986 had four major research themes: 1) to develop a macromodel to characterize indoor exposures to harmful pollutants; 2) to characterize pollutant emissions from indoor combustion sources; 3) to compile a data base of field measurements of indoor pollutants; and 4) to conduct human risk assessments associated with exposure to indoor air pollutants. Conceptually, projects that are part of the first three research themes supply the exposure data needed to assessing health risks from indoor air pollutants. In FY'86, macromodeling efforts to assess exposures to combustion pollutants were conducted; semivolatile and nonvolatile organic pollutant emissions from unvented kerosene space heaters were characterized; the concentration of indoor pollutants (CIP) data base was expanded; and a preliminary risk assessment of indoor exposures to organic pollutants was conducted. 12 references, 4 tables.

48326 (LBL—22153, pp 3.24-3.29) **Ventilation and indoor air quality control.** Fisk, W.J.; Wallman, P.H.; Mowris, R.J. May 1987. NTIS, PC A03/MF A01. File Number DE87013959.

In Applied Science Division Indoor Environment Program: Annual report, FY 1986.

The Ventilation and Indoor Air Quality Control Group conducts research on technologies for limiting indoor pollutant concentrations - these technologies include methods of: 1) ventilation; 2) air cleaning; and 3) minimizing or reducing pollutant source strengths. The goals of the research are to evaluate existing and proposed technologies and, also, to develop new technologies. To evaluate a control technology the authors consider primarily its impact on indoor pollutant concentrations, the energy requirements or savings associated with the technology, and the associated costs. The research is performed through a combination of laboratory experiments, field studies, modeling, and reviews of literature. 5 references, 2 tables.

48327 (LBL-PUB—615, pp A.71-A.79) **Atmospheric aerosol chemical sampling.** Reyes-Coraliz, W.I. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

The specific aim of this study is to develop the procedures for differentiating between the concentrations and effects of distant sources and those of local sources on atmospheric chemical species. Because of the unique geographical and climatological factors of Puerto Rico, the island is appropriate for these studies. Aerosol characterization studies based on trace element analysis and the established analysis methods will be performed.

48328 (LBL-PUB—615, pp A.81-A.90) **Nitrous oxide formation in combination.** Torrens, S.D. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

The purpose of this study was to determine the conditions that lead to the formation and destruction of nitrous oxide during the combustion of hydrocarbon fuels. Attempts were made to determine if N_2O is formed in the well-controlled environment of laboratory scale combustion experiments? In order to do so, gas chromatography was used. From the results that were obtained the authors can conclude that N_2O is formed in a well-controlled environment of laboratory - scale combustion. The results show that approximately 14 to 20 ppm of N_2O were formed. As the probe is farther away from the burner the detection of N_2O is less. Although the temperature wasn't taken into consideration it can be an influential factor in the behavior that has been seen. Due to dilution, the greatest amount of heat concentrates at the center of the burner. This explains why CO_2 has a greater concentration at the center of the burner. The authors can suggest that N_2O is a fragile molecule and doesn't exist where there is high temperature as in the center of the burner. The causes of the formation a destruction of N_2O in the entire process is yet unknown. Studies are being conducted to determine why and under what conditions this occurs.

48329 (MISU-CM—67) **Methodology for the collection and analysis of trace metals in atmospheric precipitation.** Ross, H.B. (Stockholm Univ. (Sweden). Dept. of Meteorology). 22 Oct 1984. 40p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753348.

The procedures used for the collection of rain water for trace metal analysis are described. Due to the low concentrations of many trace metals, measures were taken to avoid sample contamination. A clean room was built and acid washing of labware and rain collectors was begun. Graphite furnace atomic absorption spectroscopy (GFAAS) is used to determine trace metal concentrations. Detection limits for the GFAAS system, in its present configuration, are 0.002 ng Cd/ml, 0.04 ng Cu/ml, 0.02 ng Fe/ml, 0.008 ng Mn/ml, 0.04 ng Pb/ml and 0.002 ng Zn/ml. Initial findings in the trace metal concentration in monthly atmospheric precipition samples, collected in bulk collectors, from two sites in southern Sweden indicate that the acid washing of labwere and collectors is necessary. Also, that the contamination of samples is random and that samples are more susceptible to contamination for some metals than for others. (authors).

48330 (MISU-CM—69) **Nitrate in precipitation - a presentation of data from the European air chemistry network.** Soederlund, R.; Granat, L.; Rodhe, H. (Stockholm Univ. (Sweden). Dept. of Meteorology). Oct 1985. 71p. NTIS (US Sales Only), PC A04. File Number DE87753356.

Data are presented on the nitrate content of monthly precipitation samples collected in the European Air Chemistry Network (EACN) during the period 1955 to 1979. Employing a median two-way table statistical analyses we have found a seasonal variation of the concentration with high concentration in January through April and low concentration in June through October. All stations but one exhibit an increase in concentration during the 25 year period. The annual increase in nitrate concentration between the late fifties and early in 1979 was in the range 3-6 percent at the stations. Sampling artifacts caused by microbiological transformation in the sampled water after collection may have had a certain, probably not substantial, influence on these results. (authors).

48331 (NEI-FI—24) **Finnish research project on acidification (HAPRO). Research contents 1986.** (Ministry of Agriculture and Forestry, Helsinki (Finland); Ympaeristoeministerio, Helsinki (Finland)). 1986. 94p. NTIS (US Sales Only), PC A05/MF A01. File Number DE87753068.

The report presents the Finnish research project on acidification (HAPRO). The contents of individual studies are presented. Most of the studies are in the field of forest research or water research. Effects of air pollutants on forests and plants, on the biota of lakes and on the whole aquatic ecosystem are studied. Also the atmospheric transportation, air quality and deposition are subjects of the projects. The most of the financing comes from Ministry of the Environment and from Ministry of Agriculture and Forestry.

48332 **(NEI-SE—5) Report from the project 'Transport of persistent organical substances to, and from the atmosphere'.** Larsson, P.; Okla, L. (National Swedish Environmental Protection Board, Solna). Jan 1986. 28p. (In Sweden). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753359.

The fallout of persistent organic substances (PCB, DDT and DDE) was studied at 14 sampling stations in Sweden during 1985, and compared to the situation 1973. The amount of airborn substances was analysed at the same time. The fallout of DDT and DDE has decreased considerably since 1973, whereas PCB fallout has remained unchanged for the last 12 years. The atmosphere transport of chlorinated biphenyls was lower at the coast stations compared to the inland. This may be an effect of spreading of substances from the sea and/or transport from distant sources to Sweden. The fallout of PCB was highest at the West coast and in Abisko. The levels of DDT and DDE and the fallout of these substances decreased in a gradient from the south to the north. This indicates that atmospheric transport may be an important source for persistent organic substances in northen ecosystems. (B.O.K.). With 12 refs.

48333 **(NP—7753280) Investigation of the degradation rate of selected reference chemicals in the troposphere. Final report.** Zellner, R. (Goettingen Univ. (Germany, F.R.). Inst. fuer Physikalische Chemie; Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Apr 1985. 64p. (In German). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753280.

The degradation of chemicals in the troposphere occurs predominantly in reaction with OH radicals. The corresponding rate coefficient (k/sub OH/-value) is a direct representation of the chemicals degradability or lifetime. Through development of a laserphotolysis/resonance fluorescence (LIF) technique absolute k/sub Oh/ values (and in part the primary products) of 27 organic reference chemicals have been directly determined. Moreover, a reactivity/structure correlation was derived. The results show that for most reference chemicals tropospheric lifetimes not exceeding a few weeks are to be expected. With 36 refs., 4 tabs., 37 figs.

48334 **(ORNL/TM—10086) ADDNET Notebook: Documentation of the Acid Deposition Data Network (ADDNET) data base supporting the National Acid Precipitation Assessment Program.** Olson, R.J.; Allison, L.J.; McCollough, I.L. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 308p. NTIS, PC A14/MF A01; 1; GPO Dep. File Number DE88000029.

The Acid Deposition Data Network (ADDNET) project compiles extant data into a central data base for use in acidic deposition assessments and analyses. The ADDNET Data Base supports the integrated assessments conducted by Task Group I of the National Acid Precipitation Assessment Program (NAPAP). The ADDNET project includes a data coordination component, which deals with the expanding data needs of the program and with varied data sources, and a data base administration component, which creates the data base and distributes data to requesters. The ADDNET Notebook describes the contents and source of each data set. It also explains the conventions, processing, and quality assurance procedures used to create certified data sets. Examples of SAS programs for using the ADDNET Data Base are provided. The ADDNET Data Base uses the SAS computer software system for data storage, retrieval, analysis, and display. The data base is accessed by the ADDNET staff in both batch and interactive modes, using the ORNL IBM computer system; in addition, data sets can be transferred to other SAS systems. Data can also be exchanged as EBCDIC- or ASCII-formatted files. At the end of the second year of operation, the expanding ADDNET Data Base contained over 50 data sets, with over 900 variables, including deposition, emissions, air quality, water chemistry, forestry, aquatic resources, and other data required for the 1985 NAPAP Assessment.

48335 **(PB—87-203287/XAB) Wind transport of scalars and pollutants.** Thompson, R.S. (Environmental Protection Agency, Research Triangle Park, NC (USA). Atmospheric Sciences Research Lab.). Jun 1987. 7p. (EPA—600/D-87/200). NTIS, PC A02/MF A01.

An understanding of the transport of scalars and pollutants in the atmosphere is essential in many engineering applications including the protection of the nation's health through enforcement of the Clean Air Act. Recent results from field experiments, laboratory experiments, and numerical-modeling efforts have advanced the theory of atmospheric transport. Some specific future research areas include transport in wake flows, dense-gas clouds, and in the convective layer of the atmosphere.

48336 **(PB—87-204954/XAB) Health-Hazard Evaluation report HETA 84-496-1766, Applied Plastics, Slocum, Rhode Island.** Keenlyside, R.A.; House, L.A.; Stoekel, M.; Durand, J.M. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Jan 1987. 30p. (HETA—84-496-1776). NTIS, PC A03/MF A01.

In response to a request from the owners of Applied Plastics, Inc. (SIC-3079), Slocum, Rhode Island, an investigation was made of possible cases of polymer fume fever among workers complaining of fever, chills, fatigue, shortness of breath, nausea, musculoskeletal pain and headache. Urinary fluoride levels measured in preshift samples ranged from 0.3 milligrams/gram (mg/g) to 1.5 mg/g and from 0.2 mg/g to 1.0 mg/g in postshift samples. Breathing-zone samples showed low levels of toluene and most had a trace amount of hexane equivalents. All levels of toxic substances were well below permissible exposure limits. The authors conclude that even though the environmental and medical studies did not demonstrate high exposure levels or absorption of fumes, workers did demonstrate sometimes incapacitating symptoms of polymer fume fever. Based on this, the authors recommend changes in work practices, improved ventilation, closer attention to no smoking policies, and improved personal hygiene.

48337 **(PB—87-204962/XAB) Health-Hazard Evaluation Report HETA 86-070-1774, Silver Deer Spectrum, Boulder, Colorado.** Gunter, B.J. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Feb 1987. 14p. (HETA—86-070-1774). NTIS, PC A02/MF A01.

The management of the Silver Deer Spectrum, Boulder, Colorado, requested an evaluation of exposures to lead, glues, and solvents for workers involved in the grinding, polishing, gluing, and silkscreening of leaded-glass-crystal art objects. Sixteen breathing-zone and general room air samples were collected with lead concentrations ranging from not detectable to 0.08/cu m. Methylene chloride was found in small quantities in 13 of 14 air samples. The highest level of methylene chloride detected was 15.7 mg/cu m. No evidence of lead toxicity was noted in workers from the blood samples or from discussions held with the workers. The author concludes that a potential health hazard from lead existed at the time of the evaluation. The author recommends that care be taken to reduce lead exposure in the grinding room. No dry grinding or polishing of the leaded glass should be permitted. The down draft ventilation in the grinding stations should be maintained, cleaned, an balanced so that each work station has sufficient capture velocity.

48338 **(PB—87-204970/XAB) Health-Hazard Evaluation Report HETA 85-195-1768, Dale Electronics, Incorporated, Norfolk, Nebraska.** Lee, S.A. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Jan 1987. 17p. (HETA—85-195-1768). NTIS, PC A02/MF A01.

An evaluation was made of exposure to butyl cellosolve, epichlorohydrin, nickel, chromium, antimony, and total particulates for workers in an electronic resistor manufacturing process. No exposure to butyl cellosolve was detected among liquid coaters and no epichlorohydrin was detected in the process area air samples. No exposure to nickel or chromium was detected among mechanical-grinding spirallers. One laser spiraller was exposed to 8 micrograms/m^3 of nickel and 8 microg/m^3 chromium. Trace amounts of nickel were noted in the breathing zones of one plating lab worker and one calibrator. Total particulate exposures ranged from 0.1 to 0.9 mg/m^3. The author concludes that there were no known overexposures to contaminants at this facility and recommends further checking.

48339 (PB—87-204988/XAB) **Health-Hazard Evaluation Report HETA 86-328-1773, Memorial Hospital of Southern Oklahoma, Ardmore, Oklahoma.** Gunter, B.J.; King, M. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Feb 1987. 15p. (HETA—86-328-1773). NTIS, PC A02/MF A01.

An environmental evaluation was made of possible exposure to waste anesthetic gases at the Memorial Hospital of Southern Oklahoma, Ardmore, Oklahoma. The hospital has six surgery rooms and a recovery room. During this evaluation four of the six were in use. Samples were taken for ethrane, halothane, isoflurane, and nitrous-oxide Of 22 air samples taken, two exceeded the NIOSH criteria for ethrane of 0.5 parts per million (ppm); one exceeded NIOSH criteria for halothane of 0.5 ppm. None exceeded the isoflurane NIOSH criteria of 0.5 ppm. One exceeded the nitrous oxide standards of 25 ppm. No leaks were found in the anesthesia administering machine, pop off valve scavenging system, or any other area of the operating room. About 26 air changes per hour occurred in the operating rooms. The four elevated exposures were attributed to improper fit on an intubation tube and face masks. The authors conclude that a hazard from exposure to waste anesthetic gases did not exist at this facility.

48340 (PB—87-204996/XAB) **Health-Hazard Evaluation Report HETA 85-150-1767, Warwick Fire Department, Warwick, Rhode Island.** Keenlyside, R.A.; House, L.A.; Kent, G.; Durand, J.M. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Jan 1987. 36p. (HETA—85-150-1767). NTIS, PC A03/MF A01.

In answer to a request from the International Association of Fire Fighters (IAFF), an evaluation was made of health complaints noted by fire fighters exposed to plastic products and pesticides during two separate fires attended to by the Warwick Fire Department, located in Warwick, Rhode Island. Questionnaires were administered to 43 persons who were only present at the plastics fire and 46 who were only present at the pesticide fire and to 13 present at both fires. The men who fought the plastic products fire and the pesticide fire apparently experienced acute symptoms related to smoke and chemical inhalation during the fires, including headache, cough, sore throat, wheezing, shortness of breath, rash, dizziness, nausea, blurred vision, and numbness. The authors conclude that fire fighters at these two fires experienced acute irritant symptoms from smoke and chemical inhalation. The authors recommend use of protective clothing, use of protective equipment, prefire planning, implementation of medical surveillance for all fire fighters, and the proper cleanup of protective clothing and equipment after fires.

48341 (PB—87-205001/XAB) **Evaluation of a coated-filter sampling method for the determination of isocyanate concentrations in air.** Seymour, M.J. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA). Div. of Physical Sciences and Engineering). Apr 1987. 33p. NTIS, PC A03/MF A01.

An alternative sampling device was evaluated for the determination of isocyanates in air. Diphenylmethane and 1-(2-methoxyphenyl)piperazine were used to coat a glass-fiber filter. The piperazine reacted with aromatic and aliphatic isocyanates, forming ureas. High-pressure liquid chromatography was used to analyze these ureas with electrochemical detection. The mixing of the isocyanate aerosol with the reagent was facilitated by the diphenylmethane. When compared with the results obtained using a reference impinger method in laboratory sampling, the isocyanate air concentrations recorded from the coated-filter method were higher. When tested in the field, air concentrations determined from the impinger samplers for more than 50% of the sample pairs were higher than those obtained by the filter-sample method. The author concludes that this coated-filter method was not reliable enough to be used for determining isocyanate aerosol concentrations in the atmosphere of a work environment.

48342 (PB—87-205019/XAB) **Formaldehyde-exposure characterization in garment-manufacturing plants: a composite summary of three in-depth industrial-hygiene surveys.** Elliott, L.J.; Stayner, L.T.; Blade, L.M.; Halperin, W.; Keenlyside, R. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Jan 1987. 53p. (IWS—125.26). NTIS, PC A04/MF A01.

The extent of exposure to formaldehyde was investigated at three garment manufacturing facilities using fabrics pretreated with a formaldehyde-based resin system. Two of the facilities (in Georgia) operated on a two-shift basis with approximately 1000 and 500 workers; one facility (in Pennsylvania) operated on a one-shift basis and had approximately 600 workers. The facilities cut and sewed men's dress shirts from treated fabric. Measured exposures to formaldehyde, respirable dust, and organic cleaning solvent vapors were all below the applicable American Conference of Governmental Industrial Hygienists Threshold Limit Values and Occupational Safety and Health Administration Permissible Exposure Limits.

48343 (PB—87-205027/XAB) **Preliminary survey report: evaluation of brake-drum service controls at Pennsylvania Bureau of Vehicle Management, Vehicle Maintenance Division, Harrisburg, Pennsylvania.** Van Wagenen, H.D. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Mar 1987. 13p. (ECTB—152-19A). NTIS, PC A02/MF A01.

Exposure to asbestos during the servicing of brakes on state-owned vehicles at the Bureau of Vehicle Management Maintenance Division, Harrisburg, Pennsylvania, was investigated as part of a study of control technologies. Brakes had been serviced at this garage facility for the previous year using a BCE-1000 Clayton brake-cleaning unit, sized for cars, vans, and pickups. The brake-cleaning unit consisted of a transparent enclosure hood and a HEPA vacuum filter dust collector, designed to contain and collect all brake-lining dust during vehicular brake maintenance and replacement. The authors conclude that the Clayton BCE-1000 dust-control unit appeared to be effective in containing and collecting brake dust during all vehicular brake maintenance and replacement jobs in this situation.

48344 (PB—87-205043/XAB) **Industry-wide studies report of an in-depth survey at Firestone Synthetic Rubber and Latex Company, Lake Charles, Louisiana.** Krishnan, E.R.; Ungers, L.J.; Fajen, J.M. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). 2 Feb 1987. 44p. (IWS—147.28B). NTIS, PC A03/MF A01.

In order to assess worker exposure to 1,3-butadiene at a polymer production facility, an in-depth industrial-hygiene survey was conducted at Firestone Synthetic Rubber and Latex Company, Lake Charles, Louisiana. This facility incorporated a number of controls designed to prevent the release of chemical intermediates and products into the air. Personal protective equipment included rubber, cotton, or vinyl gloves depending on the job performed. Respirators were required for field lab samplers and maintenance personnel performing specific tasks. Half-face organic vapor respirators were used. The authors recommend that consideration be given to converting to a closed-loop sampling system for obtaining quality control samples.

48345 (PB—87-205050/XAB) **Health-Hazard Evaluation Report HETA 86-410-1772, HCFA-Meadows East Building, Baltimore, Maryland.** Kullman, G.J.; Denton, R.A. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Nov 1986. 61p. (HETA—86-410-1772). NTIS, PC A04/MF A01.

In response to a request from the Health Care Financing Administration, an investigation was made of complaints of irritation to the eyes, mucosa, skin, and respiratory tract among employees in the HCFA Meadows East Building (MEB), Baltimore, Maryland. An additional concern was the incidence of fungal sinusitis and cancer at MEB. Mean airborne fungal concentration was 75 colony-forming units per cubic meter. The authors conclude that the symptoms experienced resulted from substandard ventilation in conjunction with low-level indoor pollutants such as tobacco smoke. Neither an increased prevalence of cancer nor a building-

related cancer risk appeared to exist. The authors' recommendations include readjustment of the ventilation system to operate according to design specifications, routine maintenance and surveillance of the ventilation system, adoption and enforcement of a no-smoking policy, institution of a more-formal medical-surveillance system, and rolling/changing of roll filters in the ventilation system when the system is turned off.

48346 **(PB—87-205266/XAB) Compilation of air-pollutant-emission factors. Volume 2. Mobile sources (4th edition).** (Environmental Protection Agency, Ann Arbor, MI (USA)). Sep 1985. 553p. (AP—42-ED-4-VOL-2). NTIS, PC A24/MF A01.

Supersedes PB—81-238305; See also Volume 1, PB—86-124906.

ThIS document officially revises all previous factor (AP-42) documents for highway mobile sources. Also, the document will be periodically revised as the emissions and in-use vehicle operational characteristics vary from those presented. The document was generated to present more-recent emission factor information for highway mobile sources. As such, the March 1981 Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, EPA-460/3-81-005 document is outdated. Many of the emission rates contained in the document are found in EPA's mobile-source emission model, MOBILE3. The differences between the emission factors presented in the document and the March, 1981, Compilation Document are listed.

48347 **(PB—87-205290/XAB) Evaluation of combustion processes for destruction of liquid organic wastes, GA Technologies, Incorporated.** Jenkins, A.C.; Chang, D.P.Y. (California State Air Resources Board, Sacramento (USA). Stationary Source Div.). Oct 1985. 115p. (ARB/SS—87-04). NTIS, PC A06.

Also pub. as California Univ., Davis. Dept. of Civil Engineering rept. no. TEST-C—84-004; Portions of this document are not fully legible.

The test series described in the report was intended to demonstrate the destruction and removal efficiency (DRE) of a synthesized mixture of known refractory organic compounds when treated in a circulating-bed combustor (CBC). Characterization of products of incomplete combustion (PICs) was sought, as a fluidized (and flameless) incinerator may act in a pyrolysis mode to potentially produce products more environmentally damaging than the fuel. PIC analysis covered a broad range of kinetically anticipated products, including the seemingly ubiquitous benzene. For most compounds, apparent DRE was high. A correlation between emissions of chlorinated PICs and total unburned hydrocarbons and carbon monoxide was observed. These relationships may provide the bases for surrogate measurement of destruction efficiency. A conclusion was reached that the system holds promise for destruction of combustible organic wastes and further testing may be warranted.

48348 **(PB—87-206496/XAB) Protocol for applying and validating the CMB (chemical mass balance) model.** Pace, T.G.; Watson, J.G. (Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.). May 1987. 74p. (EPA—450/4-87/010). NTIS, PC A04/MF A01.

The protocol is intended to supplement the User's Manual for the CMB model by providing technical guidance as follows: assessing the general applicability of the CMB model to the situation under study; configuring the model with appropriate sources, source profiles, and chemical-species concentrations at receptor sites; examining model statistics and diagnostics; determining agreement with model assumptions; identifying problems, changing the model configuration and rerunning; testing the consistency and stability of model results; and evaluating the validity of model results.

48349 **(PB—87-206504/XAB) Protocol for reconciling differences among receptor and dispersion models.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.). Mar 1987. 44p. (EPA—450/4-87/008). NTIS, PC A03/MF A01.

The PM10 SIP Development Guideline, EPA-450/2-86-001, prepared by the Environmental Protection Agency (EPA), recommends that both dispersion models (DM) and receptor models, primarily the Chemical Mass Balance (CMB) model, be used to determine the contributing sources. When two or more independent methods, such as DM and CMB, are used to develop estimates for the contributing sources, differences are bound to occur. The protocol consists of an eight-step procedure for examining and reconciling differences in model estimates in a systematic, justifiable way. The steps outline a procedure for intercomparison of results, model refinement, recomparison, and development of final model estimates.

48350 **(PB—87-206579/XAB) Health-Hazard Evaluation Report HETA 86-130-1775, Owens-Illinois Glass Container Division, Hapeville, Georgia.** Roper, P.; Albrecht, W.N.; Salisbury, S.A. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Feb 1987. 24p. (HETA—86-130-1775). NTIS, PC A02/MF A01.

In response to a request from the Glass, Pottery, Plastics and Allied Workers Union Local 101, a health hazard study was performed at the Owens-Illinois glass bottle factory, Hapeville, Georgia concerning possible exposure of workers to methylene chloride (MC) and carbon monoxide (CO). No CO exposures of 9 parts per million (ppm) or above were measured during the two shifts sampled. Significant amounts of CO were given off from lift truck traffic resulting in readings from 20 to 80ppm at various areas within the warehouse. MC levels ranged from none to 9ppm. Airborne concentrations appeared to be well controlled by local exhaust ventilation. The authors conclude that although exposure levels were below existing Occupational Safety and Health Administration standards of 500ppm for MC and 50ppm for CO, exposures to MC should be reduced to the lowest feasible level due to its carcinogenic potential. Recommendations included the issuing of respirators to employees requesting them, proper use of fans, skin protection to prevent drying, education of the employees to the hazards, and removing some of the CO emissions from the lift trucks.

48351 **(PB—87-206595/XAB) Health-Hazard Evaluation Report HETA 84-180-1776, Jacksonville Fire Department, Jacksonville, Florida.** Kominsky, J.R. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Feb 1987. 25p. (HETA—84-180-1776). NTIS, PC A02/MF A01.

The efficiency of a trichlorotrifluoroethane based system to remove polychlorinated biphenyls (PCBs) from Nomex fabric garments used by the Jacksonville Fire Department, Jacksonville, Florida was evaluated. The system used a sealed dry cleaning machine with a revolving chamber and trichlorotrifluoroethane solvent. From 66 to 99% of fireborne PCB contamination and more than 99% of experimental contamination was removed from fire fighters protective clothing using the system. Because of uncertainty concerning the adequacy of decontamination, the garments were replaced. The author concludes that this system can remove a high percentage of PCB contamination; without established permissible limits for fabric levels of PCBs, it is not known if the level of decontamination is adequate.

48352 **(PB—87-206603/XAB) Preliminary survey report: control technology for gallium arsenide processing at Morgan Semiconductor Division, Garland, Texas.** Lenihan, K.L. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Mar 1987. 10p. (ECTB—163-15A). NTIS, PC A02/MF A01.

The report covers a walk through survey made of the Morgan Semiconductor Facility in Garland, Texas, to evaluate control technology for gallium-arsenide dust in the semiconductor industry. Engineering controls included the synthesis of gallium-arsenide outside the crystal pullers to reduce arsenic residues in the pullers, also reducing worker exposure to arsenic during cleaning of the crystal pullers.

48353 **(PB—87-206611/XAB) Preliminary survey report: control technology for gallium arsenide processing at Hewlett Packard, San Jose, California.** Lenihan, K.L. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Apr 1987. 11p. (ECTB—163-14A). NTIS, PC A02/MF A01.

A walk-through survey of the Hewlett Packard Company facility in San Jose, California, was prompted by an interest in the use of gallium arsenide as an alternative to silicon for the semiconductor industry. This facility produced gallium-arsenide and gallium phosphide Potential hazards existed from solvents, acids, and gases employed in wafer production. Some of the solvents included fluorocarbon compounds, xylene, and 1,1,1-trichloroethane Arsine, phosphine, hydrogen, and silane gases were used in the production processes. Worker exposures to gallium arsenide or arsenic dust were lower during the cleaning operation than they had been in other similar facilities, perhaps due to the small size of the crystal pullers used at this particular facility. According to the author, this facility is a possible candidate for an in-depth industry survey, but may not be representative of the entire industry.

48354 **(PB—87-208682/XAB) Turbulent diffusion behind vehicles: evaluation of roadway models.** Rao, S.T.; Sistla, G.; Eskridge, R.E.; Petersen, W.B. (New York State Dept. of Environmental Conservation, Albany (USA)). 1986. 11p. NTIS, PC A02/MF A01.

Pub. in Atmospheric Environment, Vol. 20, No. 6, 1095-1103(1986).

This paper presents a statistical evaluation of three highway air-pollution models (CALINE 3, HIWAY-2, and ROADWAY) using the tracer data from the General Motors Sulfate Dispersion Experiment. The bootstrap resampling procedure is used to quantify the variability in the observed concentrations due to the stochastic nature of the atmosphere. The results suggest that the variability in the observations due to the random nature of the atmosphere is about 30%. Therefore, if the predicted values are within 30% of the measured concentrations, the differences between model predictions and observations should not be considered to be significant. Comparisons of the model predictions paired and unpaired in time with measurements suggest that HIWAY-2 and ROADWAY perform best, but the performance of CALINE 3 is acceptable. Application of the extreme value theory and the bootstrap resampling procedure to the modeled and measured data (unpaired) shows that all three models are capable of predicting the extreme concentrations within the model performance criteria set forth above.

48355 **(PB—87-208690/XAB) Turbulent diffusion behind vehicles: experimentally determined turbulence mixing parameters.** Eskridge, R.E.; Rao, S.T. (Environmental Protection Agency, Research Triangle Park, NC (USA). Atmospheric Sciences Research Lab.). 1986. 12p. (EPA—600/J-86/385). NTIS, PC A02/MF A01.

Pub. in Atmospheric Environment, Vol. 20, No. 5, 851-860(1986).

The wake of a moving vehicle was simulated using a specially constructed wind tunnel with a moving floor. A blocked-shaped model vehicle was fixed in position over the test-section floor while the floor moved at the freestream air speed to produce a uniform, shear-free, approach flow. This simulates an automobile traveling along a straight highway under calm atmospheric conditions. Vertical and lateral profiles of tracer gas concentration were obtained in the wake. Profiles were taken at distances of 30, 45, and 60 model heights downwind. The equations describing the wake theory were solved numerically to determine the best turbulence scale lengths by using a wind tunnel taken at 30 model heights downwind as the inflow boundary condition and comparing the numerical computation made at 60 heights downwind to the wind tunnel data taken at this location. It was found that the best scale lengths were the vehicle width along and across the wake, and height above the surface in the vertical directions, respectively.

48356 **(PB—87-208781/XAB) Performance audit procedures for opacity monitors.** Plaisance, S.J.; Peeler, J.W. (Entropy Environmentalists, Inc., Research Triangle Park, NC (USA)). Apr 1987. 157p. NTIS, PC A08/MF A01.

Supersedes PB—84-126689.

This manual contains monitor-specific performance audit procedures and data forms for use in conducting audits of installed opacity continuous emission monitoring systems (CEMS). General auditing procedures and acceptance limits for various audit criteria are discussed. Practical considerations and common problems encountered in conducting audits are delineated, and recommendations are included to optimize the successful completion of performance audits. Performance audit procedures and field-data forms were developed for six common opacity CEMS: (1) Lear Siegler, Inc. Model RM-41; (2) Lear Siegler, Inc. Model RM-4; (3) Dynatron Model 1100; (4) Thermo Electron, Inc. Model 400; (5) Thermo Electron, Inc. Model 1000A; and (6) Enviroplan Model D-R280 AV. Generic audit procedures are included for use in evaluating opacity CEMS with multiple transmissometers and combiner devices. In addition, several approaches for evaluating the zero-alignment or clear-path zero response are described. The zero-alignment procedures are included since the factor is fundamental to the accuracy of opacity monitoring data, even though the zero-alignment checks cannot usually be conducted during a performance audit.

48357 **(PB—87-209193/XAB) Role of nitrogen oxides in nonurban ozone formation in the planetary boundary layer over N (North) America, W (Western) Europe, and adjacent areas of ocean.** Altshuller, A.P. (Environmental Protection Agency, Research Triangle Park, NC (USA). Atmospheric Sciences Research Lab.). 1986. 24p. (EPA—600/J-86/380). NTIS, PC A02/MF A01.

Pub. in Atmospheric Environment, Vol. 20, No. 2, 245-268(1986).

The status of knowledge on photochemical ozone formation and the effects of nitrogen oxides and peroxyacyl nitrates on such formation was evaluated. The literature is reviewed on nonurban ozone and nitrogen oxide concentration distributions, ozone lifetimes, nitrogen oxide lifetimes, and ozone formation in plumes as related to nitrogen oxide. The modeling approaches applied to ozone formation with urban plumes, power plant plumes, high-pressure systems, and during longer-range transport of ozone formation associated with reactions of natural hydrocarbons and nitrogen oxide near ground level as well as photochemical ozone formation associated with reactions of carbon monoxide and more-persistent organic species with nitrogen oxides in the free troposphere are considered. Correlation studies and laboratory measurements relating ozone in nonurban locations to precursors also are evaluated.

48358 **(PB—87-209235/XAB) IACP (Integrated Air Cancer Project) emissions: transformations and fate.** Cupitt, L.T.; Claxton, L.D.; Shepson, P.B.; Kleindienst, T.E. (Environmental Protection Agency, Research Triangle Park, NC (USA). Atmospheric Sciences Research Lab.). Jul 1987. 12p. (EPA—600/D-87/211). NTIS, PC A02/MF A01.

As part of the Integrated Air Cancer Project (IACP), diluted emissions from wood stoves and automobiles were injected into a Teflon smog chamber and irradiated to simulate their photochemical transformation in the atmosphere. Changes in the chemical composition and physical properties of the gaseous and aerosol-bound complex mixtures were monitored throughout the experiments. The mutagenicity of the gas-phase components and of the aerosol-bound chemicals were both measured before and after irradiation. Comparisons of the mutagenic activity between the gas-phase and aerosol-bound chemicals have been estimated. When the mutagenicity is expressed in units of revertants per cubic meter of air, the gas-phase reaction products are found to be the most mutagenic. Similar results were obtained from preliminary experiments using an idling automobile as the pollutant source.

48359 **(PB—87-209243/XAB) Utility emissions software for the NAPAP (National Acid Precipitation Assessment Program) 1985 emissions inventory.** Wilson, J.H.; Pechan, E.H.; Hamilton, W.D.; Pahl, D.A. (Hengel Associates, Rapid City, SD (USA)). Jul 1987. 14p. NTIS, PC A02/MF A01.

This paper discusses utility emissions software for the development of the National Acid Precipitation Assessment Program (NAPAP) 1985 emissions inventory. For 1985, the development of an accurate and complete emissions inventory for pollutants considered to be precursors of acid deposition was identified as a critical element of the NAPAP. For 1985, NAPAP high-priority emissions inventory data needs were incorporated into the National Emissions Data System (NEDS) reporting process with the primary objective being to complete a national source/emissions data base for calendar year 1985 for all sources with actual emissions of SO_2, NOx, or VOCs greater than 100 tons per year. Recognizing the importance of electric utilities as a component of the NAPAP 1985 emissions inventory, and to assist the states in preparing their 1985 NEDS

submittals, the project described in the paper made some of the utility data submitted to the U.S. Department of Energy (DOE) available on microcomputers so that they could be used readily by state air pollution control agencies and others.

48360 **(PB—87-209268/XAB) Evaluation of the chemical and physical processes affecting sulfate and nitrate wet deposition.** Shim, S.G.; Chang, Y.S.; Cho, S.Y.; Carmichael, G.R. (Iowa Univ., Iowa City (USA). Dept. of Chemical and Materials Engineering). Jul 1987. 16p. NTIS, PC A02/MF A01.

The STEM-II model was applied to a case study of the acid deposition upwind and downwind of Philadelphia, Pennsylvania. The model has the Atkinson-Lloyd kinetics mechanism for gas-phase chemistry and an aqueous-phase mechanism for 22 species. The model results indicate that the major trends in the data are correctly simulated. Time histories at particular grid locations are consistent with the known meteorological conditions.

48361 **(PB—87-209284/XAB) Relationships involving fine-particle mass, fine-particle sulfur, and ozone during episodic periods at sites in and around St. Louis, Missouri.** Altshuller, A.P. (Environmental Protection Agency, Research Triangle Park, NC (USA). Environmental Sciences Research Lab.). 1985. 14p. (EPA—600/J-85/494). NTIS, PC A02/MF A01.

Pub. in Atmospheric Enviroment, Vol. 19, No. 2, 265-276(1985).

A number of investigations have been published on relationships involving particulate sulfate over regions of North America. Elevated concentrations of sulfate and ozone have been identified as occurring during the same periods in the summer months of the year in the United States. Particle sulfur and particle mass measurements obtained from the regional monitoring stations (RAMS) in and around St. Louis, Missouri, during the Regional Air Pollution Study (RAPS) have been discussed previously. Ozone measurements made in the RAPS study have received separate consideration. The large extended series of concurrent measurements of fine-particle sulfur, fine-particle mass, and ozone at both urban and nonurban locations in the St. Louis area provides an opportunity to examine relationships among these species in detail. The emphasis here is on the patterns of concentration of these species particularly during periods of especially high concentrations, episodic periods.

48362 **(PB—87-209300/XAB) Photooxidation of allyl chloride.** Edney, E.O.; Shepson, P.B.; Kleindienst, T.E.; Corse, E.W. (Northrop Services, Inc., Research Triangle Park, NC (USA)). 1986. 14p. NTIS, PC A02/MF A01.

Pub. in International Jnl. of Chemical Kinetics, Vol. 18, 597-608(1986).

The photooxidation of allyl chloride was studied by irradiation either in 100-L Teflon bags or in a 22.7-cu m Teflon smog chamber in the presence of added NOx. In the absence of added hydrocarbons, the reaction involves a Cl atom chain, which leads to a highly reactive system. A reaction mechanism is presented to account for the following photooxidation products: chloroacetaldehyde, formaldehyde, 1,3-dichloroacetone, 3-chloroacrolein, acrolein, glyoxal, chloroperoxyacetylnitrate, and peroxypropenylnitrate. The rate constant for OH reaction with allyl chloride at 298K was measured by a relative rate method under conditions where the Cl atom chain length was small and was found to be kOH = 1.7 x 10^{-11} cc molecule (-1) sec (-1).

48363 **(PB—87-209318/XAB) Impact of urban and industrial emissions on mesoscale precipitation quality.** Patrinos, A.A.N. (Brookhaven National Lab., Upton, NY (USA)). 1985. 11p. NTIS, PC A02/MF A01.

Pub. in Jnl. of the Air Pollution Control Association, Vol. 35, No. 7, 719-727(Jul 1985).

Results from an acid rain field study around the city of Philadelphia are presented. The study involved the sampling of wet deposition at a network of 40 sites within a distance of 60 km from the Delaware River. Emphasis was placed on event-type rain sampling of frontal and primarily nonconvective storms which are responsible for most of the Northeast's wet deposition. For most storms, meteorological conditions contributed to a predominant southeasterly transport. Since most of the area's urban and industrial emissions occur along the Delaware River, the Pennsylvania sector of the network was identified as the downwind (target) region; the New Jersey sector was the upwind (control) region.

48364 **(PB—87-209631/XAB) Air-quality standard for SO_2 and particles (Directive 80/779/EEC) and its significance for the other main air pollutants.** (Commission of the European Communities, Luxembourg). 1986. 240p. (EUR—10644-EN). NTIS, PC PC E09/MF E09.

Customers in the European Community countries should apply to the Office for Official Publications of the European Communities, B.P. 2985, Luxembourg.

The aim of the study was: (1) compiling information on limit and guide values set out in industrialized countries and to identify those which are actually combined ones; (2) reviewing the relevant literature on combined effects of the pollutants NO_2, SO_2, and O_3 and particulate matter of human health and the environment; (3) deriving, if possible, non-adverse effects levels with pollutant concentrations measured in ambient air; (4) comparing the combined non-adverse effects levels with pollutant concentration measured in ambient air; (5) advising the Commission in which way the findings of the study, if necessary, could be incorporated into the actual air pollution abatement policy.

48365 **(PB—87-212742/XAB) International Sulfur Deposition Model Evaluation (ISDME).** Clark, T.L.; Dennis, R.L.; Seilkop, S.; Alvo, M.; Voldner, E.C. (Environmental Protection Agency, Research Triangle Park, NC (USA). Atmospheric Sciences Research Lab.). Jul 1987. 25p. (EPA—600/D-87/232). NTIS, PC A02/MF A01.

See also PB—85-210847.

Eleven linear-chemistry atmospheric models of sulfur deposition were evaluated for each season of 1980. The evaluation data set consisted of sulfur wet deposition amounts calculated from screened precipitation-chemistry measurements at 46 sites across eastern North America. The focus of this study differed substantially from those of preceding model-evaluation studies in that the ISDME emphasized the ability of the models to replicate, within the uncertainties of the observations, the spatial patterns of observed seasonal amounts. Patterns of the predictions and observations were constructed via an interpolation technique known as simple kriging, which minimizes interpolation errors and estimates uncertainties resulting from the interpolation errors as well as measurement errors. The evaluation results indicated, that for all seasons but spring, the models generally did not mimic the observed location of the seasonal maximum amounts of sulfur wet deposition within the uncertainty limits. However, the interpolated predictions of eight models were within the uncertainty limits of the interpolated observations across at least 80% of the evaluation region for at least three seasons.

48366 **(PB—87-212767/XAB) Rocky Mountain Acid Deposition Modeling Assessment Project--goals and current status.** Morris, R.E.; Liu, M.K.; Svoboda, L.; Huber, A. (Systems Applications, Inc., San Rafael, CA (USA)). Jul 1987. 23p. NTIS, PC A02/MF A01.

The objective of the Rocky Mountain Acid Deposition Modeling Assessment Project is to assemble an acid deposition model based on currently available air-quality and meteorological models and modules that adequately describe the processes of acid deposition in the Rocky Mountain region. The model would be used in-house by Federal and State agencies in the western states. After reviewing and selecting mesoscale meteorological and acid-deposition models appropriate to application in the Rocky Mountain region, three alternative modeling approaches were identified. The modeling approach taken will depend upon the recommendations of the regulatory agencies. The resulting modeling system should be operational by the end of summer 1987.

48367 **(PB—87-213302/XAB) Models and statistical methods for gaseous-emission testing of finite sources in well-mixed chambers.** Dunn, J.E. (Arkansas Univ., Fayetteville (USA). Dept. of Mathematical Sciences). 1987. 9p. NTIS, PC A02/MF A01.

Pub. in Atmospheric Environment, Vol. 21, No. 2, 425-430(1987).

This paper proposes two families of mathematical models to represent either the concentration of a gaseous emission in (or the accumulated amount exiting from) a well-mixed, environmentally controlled test chamber. A thin-film model, which seems applicable to such sources as carpet adhesive, has the capability of isolating the true emission rate constant from chamber effects. It has successfully modeled emissions of methyl ethyl ketone, a C8 alcohol, and butyl propionate from latex caulk. Chamber effects in the form of temporary wall retention were identified for the latter two compounds. An analogous, deep source, diffusion-limited model for plywood, etc., once fitted to a data set, can be used to generalize to other combinations of source surface area, chamber volume, and air exchange rate.

48368 **(PB—87-213351/XAB) Kinetics investigations of atmospheric chemical reactions. Doctoral thesis.** Hills, A.J. (National Center for Atmospheric Research, Boulder, CO (USA)). 1987. 117p. (NCAR/CT—107). NTIS, PC A06/MF A01.

Two gas-phase kinetics investigations were performed using a low-pressure, fast-flow system with mass spectrometric detection. The first investigation was a study of the rates of the reactions of diatomic sulfur, S_2, with O, O_2, O_3, N_2O, NO and NO_2 at 409K and low pressure (0.89-3.0 Torr). The reaction with atomic oxygen was found to be fast. Under the experimental conditions, S_2 did not react with any of the other species, but upper limits to the reaction rate constants are reported. The second investigation was a study of the synergistic coupling of atmospheric bromine and chlorine chemistry. It is concluded that the ClO+BrO reaction could account for a large fraction of the spring-time ozone hole reported recently, provided that at least 20 ppt of total inorganic bromine is present, and it may provide a source of chlorine dioxide of sufficient magnitude to explain the recent measurements of this species in the Antarctic stratosphere.

48369 **(PB—87-219374/XAB) Atmospheric nitrogen oxides: their detection and chemistry. Second-year report, August 1, 1984-August 31, 1985.** Davis, D.; Bradshaw, J.; Sandholm, S.; Rodgers, M.; Chameides, W. (Georgia Inst. of Tech., Atlanta (USA). School of Geophysical Sciences). 1987. 76p. NTIS, PC A05/MF A01.

See also report for Jul 1983-Aug 1984, PB—85-193910.

The second year of work under this contract concentrated on instrument development and field studies to investigate the atmospheric chemistry of the nitrogen oxide family. Available laboratory and field data, in conjunction with model calculations, suggest that this family of compounds may impact on air quality in at least three significant ways: (1) produce one of the major atmospheric acidic compounds, HNO_3; (2) lead to major increases in the concentration levels of potentially harmful oxidants such as O_3 and PAN-type compounds; and (3) control the levels of still other more-reactive atmospheric oxidants such as OH and HO_2. Specific species for which measurement technology was explored during the second year of work include NO_2, NO_3, and HNO_3. Much of the field-sampling effort during the second year focused on the nighttime chemistry of the nitrogen oxides, with special emphasis being placed on observations of NO. In addition to ground-based field studies, additional airborne field studies were conducted.

48370 (PNL-SA—14225, pp 49-64) **Interpretation of work area and environmental sampling.** Ritter, P.D.; Alvarez, J.L.; Novick, V.J. (Idaho National Engineering Lab., Idaho Falls). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

Meaningful interpretation of widely variable airborne contamination measurement is a difficult problem. Exposure limits, action levels, etc., are rigid interpretations of inherently variable environmental or workplace conditions, and are useful for control and regulatory compliance evaluations. Such limits force actions to reduce contamination, but have limited usefulness as benchmarks for evaluating isolated or nonrepresentative measurements. This paper deals with interpretation of exposure estimates based on nonrepresentative sampling. The use of hard limits for interpreting measurements of legal record simplifies judgment during cursory audits (you are clearly in or not in compliance), more aggressive questioning of the validity of these records may effectively invalidate them in a courtroom situation. 12 references, 1 figure, 1 table.

48371 (PNL-SA—14225, pp 65-76) **Workplace air monitoring and sampling practices at DOE facilities.** Swinth, K.L.; Kenoyer, J.L.; Selby, J.M. Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

The Pacific Northwest Laboratory (PNL) surveyed the current air monitoring and sampling practices at U.S. Department of Energy (DOE) facilities as a part of an air monitoring upgrade task. A comprehensive questionnaire was developed and distributed to DOE contractors through the DOE field offices. Twenty-six facilities returned a completed questionnaire. Questionnaire replies indicate a large diversity in air sampling and monitoring practices among DOE facilities. The differences among the facilities exist in monitoring and sampling instrumentation, procedures, calibration, analytical methods, detection levels, and action levels. Many of these differences could be attributed to different operational needs. 5 references, 2 figures, 2 tables.

48372 (PNL-SA—14225, pp 87-100) **Particle transport efficiency of sampling lines: theory and practical experience with sample-line losses.** Alvarez, J.L.; Novick, V.J.; Ritter, P.D. (Idaho National Engineering Lab., Idaho Falls). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

There are situations where it is inconvenient or impossible to place air sampling equipment in the location to be sampled. Also, fast response time for source concentration measurements may be required, where diffusion to a detector is too slow and the resulting dilution would cause a reduction in sensitivity. Sampling lines may be used to transport the sampled air from a remote location to a collection device or analytical instrument. However, sample lines do have drawbacks. Transport of airborne particles through sample lines is never 100% efficient; particles losses occur through a variety of mechanisms and are generally dependent upon the sample's particle size distribution. This paper considers the applicability of sample lines, the sample line loss mechanisms, and the interpretation of line-transported samples. 13 references, 1 figure, 1 table.

48373 (PNL-SA—14225, pp 193-209) **Virtual impactor for personal and area air sampling.** Novick, V.J.; Alvarez, J.L.; Ritter, P.D. (Idaho National Engineering Lab., Idaho Falls). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

A multistage virtual impactor consisting of two separation stages and yielding three particle size classes has been designed and fabricated. Efficiency and loss curves have been experimentally determined at ambient conditions for each stage. The small physical size and ability to operate at low flow rates make the impactor very versatile. The uses for a multistage virtual impactor range from high-pressure, high-temperature applications to ambient personal air sampling. 7 references, 4 figures, 1 table.

48374 **(SNV-PMK-IR—9) Air pollution and vegetational damages in natural vegetation. A literature review.** Andersson, B. (National Swedish Environmental Protection Board, Uppsala). Mar 1984. 24p. (In Swedish). NTIS (US Sales Only), PC A02/MF A01. File Number DE87753354.

This publication gives a compilation of literature treating the effects of air pollution on natural vegetation.The aim of this study has been to find suitable monitoring methods for detection and follow up of changes in natural vegetation mainly forests, exposed to air pollution in low concentration.The aim of this work has also been to give a general review of the area. (BoK). 84 refs.

48375 (STEV-FBT—87-17) Flue gas condensation - state-of-the-art and research necessities. Flinta, C.; Svedberg, G. (Statens Energiverk, Stockholm (Sweden)). Oct 1986. 39p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. File Number DE87753110.

Flue gas condensation is a technique which has gained a lot of interest in Sweden in recent years. It is a technique for energy conservation as well as cleaning of flue gases. The purpose with this work is to form a basis of future developments and research. The 'Statens Energiverk' has supported this study. There are models for condensation from non-condensable gases. When performing flue gas condensation, simultaneous processes occur. Essentially, these are condensation, gas absorption, dust removal and fogging. None of the existing models do, however, include these processes. There is a great need of such models for the development of the flue gas condensation technique. An urgent field for research will then be to clarify the fundamental phenomena in flue gas condensation. There are a lot of possible systems for flue gas condensation. Today flue gas condensing equipment is commercially available. They are principally designed to give high gas cleaning efficiency with low temperature heat recovery. With further research still more efficient systems are possible to design, both from an energy utilization and an environmental point of view. These future systems need to be based not only on energy analysis but also on exergy analysis. The quality of heat must be taken into account to a much higher degree in the future than is today. For this reason, methods must be developed to make it possible to carry out such exergy analysis. This is of special importance when considering the international market, where district heating is not very much expanded. (authors). With 40 refs.

48376 Application of advanced very high resolution radiometer vegetation index to study atmosphere-biosphere exchange of CO_2. Fung, I.Y.; Tucker, C.J.; Prentice, K.C. (NASA Goddard Space Flight Center Institute for Space Studies, NY). *Journal of Geophysical Research;* **92**: No. D3, 2999-3015(20 Mar 1987). Contract AC05-84OR21400.

Normalized difference vegetation indices derived from radiances measured by the Advanced Very High Resolution Radiometer aboard the NOAA 7 polar-orbiting satellite were used to prescribe the phasing of terrestrial photosynthesis. The satellite data were combined with field data on soil respiration and a global map of net primary productivity to obtain the seasonal exchange of CO_2 between the atmosphere and the terrestrial biosphere. The monthly fluxes of CO_2 thus obtained were employed as source/sink functions in a global three-dimensional atmospheric tracer transport model to simulate the annual oscillations of CO_2 in the atmosphere. Reasonable agreement was found between the simulated and observed annual cycles of atmospheric CO_2 at the locations of the remote monitoring stations. The results demonstrate that satellite data of high spatial and temporal resolution can be used to provide quantitative information about seasonal and longer-term variations of photosynthetic activity on a global scale. Atmospheric CO_2 observations and a three-dimensional atmospheric model have been used to validate the translation of the nondimensional satellite data into dimensional carbon fluxes. Direct calibration will require extensive ground truth and field measurements at ecosystem scales.

48377 Field monitoring design considerations for assessing indoor exposures to combustion pollutants. Traynor, G.W. (Lawrence Berkeley Lab., CA). *Atmospheric Environment;* **21**: No. 2, 377-383(1987). (CONF-8505194—).

From Conference on characterization of contaminant emissions from indoor sources; Triangle Park, NC, USA (13 May 1985).

Laboratory and controlled field studies of indoor air quality (IAQ) have characterized pollutant emission rates from combustion sources and have measured other key indoor air pollution parameters such as air exchange rates and indoor reactivity rates for the houses investigated. In addition, several field studies have attempted to measure, with varying degrees of success, pollutant exposures, indoor pollutant concentrations, and other parameters in large populations. To date, there exists no comprehensive strategy for assessing distributions of exposures in large populations. This paper outlines important parameters that affect combustion-related indoor air pollution concentrations and exposures, delineates weaknesses in our current understanding of exposures and field sampling methodologies, and mentions important considerations in planning appropriate field sampling strategies. 24 refs.

48378 Carbon cycle: 1985 glacial to interglacial changes in the operation of the global carbon cycle. Broecker, W.; Peng, T.H. (Lamont-Doherty Geological Observatory, Palisades, NY). *Radiocarbon;* **28**: No. 2A, 309-327(1986).

The hottest topic for those interested in the earth's carbon cycles is the change in atmospheric CO_2 content between glacial and interglacial time. What caused it? What is its role in glacial cycles? The authors evaluate here the hypotheses that have been put forward to explain the CO_2 change with evidence from deep sea sediments. They conclude that all the hypotheses have serious drawbacks and that much effort will have to be expended in gathering more data from ice-cores and ocean sediments before they will be pointed toward the correct scenario. Also, thoughtful modeling aimed at depicting the ties between pCO_2, O_2, $^{13}C/^{12}C$, $^{14}C/^{12}$, and nutrient constituents in the sea for various modes of circulation will have to do done before the evidence from ocean cores can be properly interpreted.

48379 Disulfate ion as an intermediate to sulfuric acid in acid rain formation. Chang, S.G.; Littlejohn, D.; Hu, K.Y. (Lawrence Berkeley Lab., CA). *Science (Washington, D.C.);* **237**: 756-758([1987]).

The oxidation of the bisulfide ion by dissolved oxygen to produce the sulfate ion involves the formation of a previously undetected intermediate. This intermediate has a fairly strong Raman band at 1090 wave numbers and a weak Raman band at 740 wave numbers, both of which are probably due to sulfur-oxygen stretches. The intermediate is proposed to be the disulfate ion $S_2O_7^{2-}$, which hydrolyzes into H^+ and either SO_4^{2-} or HSO_4^{2-} with a half-life of about 52 seconds at 25°C.

5003 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 47229, 47451, 47471, 48304, 48371, 48501, 49157

48380 (DOE/ER/60546—2) The atmospheric chemistry of Po-218: Technical report for the period March 1, 1987 to August 31, 1987. Hopke, P.K. (Illinois Univ., Urbana (USA). Inst. for Environmental Studies). 1987. Contract FG02-87ER60546. 27p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014666.

The chemical and physical properties of ^{218}Po immediately following its formation from ^{222}Rn decay are important in determining its behavior in indoor atmospheres and plays a major part in determining its potential health effects. In 88% of the decays, a singly charged, positive ion of ^{218}Po is obtained at the end of its recoil path. The modes of neutralization, small ion recombination, electron transfer, and electron scavenging are reviewed. In typical indoor air, the ion will be rapidly neutralized by transfer of electrons from lower ionization potential gases such as NO_2. The neutral molecule can then become incorporated in ultrafine particles formed by the radiolytic processes in the recoil path. The evidence for these particles is presented.

48381 (INIS-mf—10956, pp 36) Effect of the sticking probability of radon daughters of airborne activity. Leuschner, A.H.; Rossouw, J.W. (Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48382 (IPPJ-DT—130) Measurements of environmental radiations and radioactivities in Toki, 4. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Sep 1986. 54p. (In Japanese). NTIS (US Sales Only), PC A04/MF A01. File Number DE87702940.

This is a series of reports concerning the achievements of an IPP-Toki collaborational work on the environmental survey of radiations and radioactivities in Toki Area, where the new IPP experimental site is to be constructed. A School Teachers' Group of Science has been organized in Toki and been active in good cooperation with the Environmental Measurement Working Group (formerly, Site and Facilities Team) of IPP to perform various kinds of measurement over the area. In this fourth issue of the series are contained several articles mainly discussing the results obtained in 1984 — 85 period, including the following topics: 1) Method of In-Situ γ-Spectrometry with a Portable Ge-Detector, 2) Observed Radioactivities in Various Parts of Toki, 3) Method of Environmental Tritium Measurement, 4) Observed Tritium Concentrations in River Waters in Toki, 5) Summary of Radiation Dose Rates Observed in Toki 1982 — 84, 6) 1985 TLD Observations in Toki, 7) Reports of Visits to Several Facilities in Japan.

48383 (LBL—22153, pp 3.2-3.10) **Indoor radon.** Sextro, R.G.; Nero, A.V.; Garbesi, K.; Harrison, J.; Loureiro, C.; Moed, B.A.; Nazaroff, W.W.; Nuzum, T.; Prill, R.; Revzan, K.L.; Turk, B.H. May 1987. NTIS, PC A03/MF A01. File Number DE87013959.

In Applied Science Division Indoor Environment Program: Annual report, FY 1986.

Radon and its radioactive decay products are ubiquitous contaminants of indoor air, and exposures to radon progeny are estimated to be responsible for several thousand cases of lung cancer per year in the US. Within the past several years, houses with indoor concentrations two to three orders of magnitude above the average concentration of ca. 60 Bq m^{-3} (1.5 pCi/L) have been found. These homes (and other like them) have been the focus of increasing concern regrading the health risks associated with occupancy of such homes. The goals of the research conducted by the Indoor Radon group are to 1) provide a method of predicting or identifying geographical areas where houses with elevated indoor concentrations might be found; 2) to improve understanding of the mechanisms for production and transport of radon through soils and into buildings; 3) to identify, develop and investigate means of controlling high indoor radon concentrations; and 4) to study the behavior of radon progency under a variety of indoor environmental conditions. 5 references, 5 figures, 4 tables.

48384 (PB—87-215356/XAB) **Development and demonstration of indoor radon-reduction measures for 10 homes in Clinton, New Jersey. Final report, April 1986-January 1987.** Michaels, L.D.; Brennan, T.; Viner, A.S.; Mattes, A.; Turner, W. (Research Triangle Inst., Research Triangle Park, NC (USA)). Jul 1987. 176p. (REPT—471U-3065-52). NTIS, PC A09/MF A01.

This report discusses the development and demonstration of indoor radon reduction methods for 10 houses in Clinton, New Jersey, where (in the spring of 1986) the New Jersey Department of Environmental Protection (DEP) located a cluster of houses with extremely high radon levels. The work was to be completed before the 1986-87 winter heating season began. The demonstration houses were selected from 56 in the Clinton Knolls subdivision. All of these houses had shown radon concentrations in excess of 64 pCi/1 when monitored in the spring of 1986. Each house was inspected, and 10 representative houses were selected for the radon-reduction demonstration project. Following intensive diagnostic work and monitoring in each house, house-specific radon-reduction plans were developed. With the agreement of the homeowners, radon-reduction systems were installed during the summer of 1986. All 10 of the houses had radon concentrations reduced significantly by the fall of 1986. The average cost of radon reduction was $3127.

48385 (PNL-SA—14225, pp 7-27) **Detection capabilities and accuracy requirements of concentrations of radioactive material in air for radiation protection purposes.** Brodsky, A. (Nuclear Regulatory Commission, Washington, DC). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

Recent developments in the formulation of detection capability and accuracy criteria for bioassay measurements will be interpreted and adapted to provide similar criteria for the measurement of air concentrations of radioactive material for radiation protection purposes. Considerations of accuracy will be related to the known variability of measurement processes, as well as the uncertainties in the calculated limits of intake that serve as the basis of regulatory and voluntary standards of practice. Formulations and criteria will be presented for minimum detection amounts (MDA) and precision and bias of measurements for radiation protection purposes. 17 references.

48386 (PNL-SA—14225, pp 29-47) **Performance testing of workplace air monitors using procedures based on draft ANSI N42.17B.** Kenoyer, J.L.; Higby, D.P.; Swinth, K.L.; Mishima, J.; Selby, J.M. Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

The performance of commercially available continuous air monitors used in the workplace to monitor levels of airborne particulates (alpha, beta/photon emitters) was evaluated by personnel at the Pacific Northwest Laboratory. Testing procedures are based on criteria and methods in draft ANSI N42.17B, "Performance Specification for Health Physics Instrumentation - Occupational Airborne Radioactivity Monitoring Instrumentation." Testing requirements and results are discussed for the following tests: stability; effects of temperature, humidity, and ambient pressure; alarm threshold drift; coefficient of variation; response time; energy dependence; and air flow rate accuracy. Test results show that certain systems may show large temperature, humidity, or ambient pressure effects; interference effects from radio frequency fields; very slow response times; a large beta-energy dependence; or a saturation problem in high-exposure conditions. Systems performed well when compared to stability, alarm threshold drift, and air flow rate accuracy criteria. 2 references, 6 figures, 6 tables.

48387 (PNL-SA—14225, pp 79-86) **Plutonium aerosol size distributions in a reprocessing plant and during decommissioning operations.** Perrin, M.L. (Commissariat a l'Energie Atomique, Fontenay aux Roses, France). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

A field sampling program was performed to estimate the in situ atmospheric radioactive contamination by plutonium aerosols. This paper concerns the measurement of size characteristics of plutonium aerosols generated by typical operations of reprocessing and decommissioning. 1 reference, 2 figures, 3 tables.

48388 (PNL-SA—14225, pp 157-173) **Design and assessment of a personal monitor to optimize the occupational monitoring in plutonium laboratories.** Charuau, J. (Commissariat a l'Energie Atomique, Gif-sur-Yvette, France). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

The handling of products, including transuranic elements, in CEA (Commissariat a l'Energie Atomique, France) hot laboratories can give rise to incidental situations involving airborne contaminations. The follow-up and evaluation of the corresponding transfer pathways by contamination transfer experiments show that personal monitors are expected to give an alarm sooner than area monitors. This paper presents the design and performance of a prototype for air contamination personal monitoring. This appropriate monitor for transuranic elements is called MONICA α. Patented by CEA, it is under development now and soon, will be in production for use in corresponding facilities. 13 references, 4 figures, 3 tables.

48389 (PNL-SA—14225, pp 175-192) **Evaluation of personal air sampling pumps.** Ritter, P.D.; Novick, V.J.; Alvarez, J.L.; Huntsman, B.L. (Idaho National Engineering Lab., Idaho Falls). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

Personal air samplers are used to more conveniently obtain breathing zone samples from individuals over periods of several hours. Personal air sampling pumps must meet minimum performance levels under all working conditions to be suitable for use in radiation protection programs. In addition, the pumps should be simple to operate and as comfortable to wear as possible. Ten models of personal air sampling pumps were tested to evaluate their mechanical performance and physical characteristics. The pumps varied over a wide range in basic performance and operating features. Some of the pumps were found to have adequate performance for use in health physics air sampling applications. 3 references, 2 figures, 5 tables.

48390 (PNL-SA—14225, pp 211-237) **Transuranic-aerosol-measurement system for the workplace or stack monitoring.** Kaifer, R.C.; Kordas, J.F.; Phelps, P.L.; Prevo, C.T.; Biermann, A.H.; Rueppel, D.W.; Sawyer, D.L.; Del Vasto, R.M.; Merrill, T.J.; Salbeck, R.E. (Lawrence Livermore National Lab., CA). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

This compact transuranic-aerosol-measurement system, using alpha spectroscopy at vacuum, has a sensitivity of less than 0.5 MPC-h for ^{239}Pu. In addition, a detector is mounted in the inlet pipe that responds immediately if there is a release of radioactivity; then, after an appropriate time, the filter is moved to the vacuum chamber for more sensitive off-line analysis. The system is very efficient for particles as large as 10 μ m in diameter. A microcomputer controls the filter transport, operates as a 256-channel pulse-height analyzer (PHA), performs calculations, checks calibration, and drives a matrix display and a central computer. This instrument, the Workplace Transuranic Aerosol Measurement System (WOTAMS), has been developed for use in facilities that process transuranics with the expectation it will further evolve into a commercial product to replace those less sensitive instruments now widely used. 10 references, 8 figures, 2 tables.

48391 (PNL-SA—14225, pp 239-286) **Development of a room air monitor system and workplace transuranic aerosol measurement system.** Tyree, W.H.; Balmer, D.K. (Rockwell International Corp., Golden, CO). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

A room air monitor under development at Rocky Flats will detect transuranic aerosols with improved sample collection and alpha particle counting efficiencies. The new instrument will be integrated into present building sampling systems replacing older commercial units now in service. The collection filter medium has been designed to simplify handling and identification procedures. Operating parameters for the system include a sampling rate of 50 liters per minute, with a counting geometry of at least twenty percent. Projected sensitivity is about 0.3 MPC-day. Estimated cost is $2,000.00 for a sampling head with a 1700mm^2 are ion-impacted detector, filter holder and package. This cost includes the electronics counting system with local alarms and battery backup. The sampling head will be produced in quantity as an aluminum casting. A front panel liquid crystal display scalar will indicate the net count obtained from long-lived emitters in the presence of radon interference. The unit includes the option of plug-in high-power audio and visual alarm outputs. A working prototype will be available for inspection and evaluation at the October Workshop. 6 figures, 1 table.

48392 (PNL-SA—14225, pp 289-306) **Room air monitoring at the Karlsruhe Nuclear Research Center.** Dilger, H. (Karlsruhe Nuclear Research Center, West Germany). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

The derivation of limits on the activation concentration of room air from the Radiation Protection Ordinance is explained. The type of equipment used is described and illustrated. The report outlines the equipment setup and the evaluation of samples. The procedure for measures taken when the derived limits are exceeded is also discussed. Finally, a summary of the purpose of room air monitoring is presented. 2 references, 10 figures, 2 tables.

48393 (PNL-SA—14225, pp 307-320) **Aerosol deposition and losses in 2 alpha air monitors.** Biermann, A.H.; Sawyer, S.R. (Lawrence Livermore National Lab., CA). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

The authors assessed particle deposition and loss occurring in two alpha air monitors: an Eberline Alpha-3 continuous air monitor (CAM) and a working area transuranic aerosol monitor (WOTAMS). For both instruments the authors investigated the dependence of particle size on losses in the sampling inlets and the real-time alpha detector areas. The authors determined the uniformity of particle deposition on the filter to ascertain the effectiveness of the detector and collection-filter configuration. Results indicate that particle losses are a strong function of particle size in the CAM unit, with a 44% loss occurring for 6-μm-diameter aerosols and a 0.3% loss for 0.6-μm-diameter aerosols. Losses in the WOTAMS were less than 1% for particle diameters in the 0.6-8-μm range. 1 reference, 2 figures, 2 tables.

48394 (PNL-SA—14225, pp 321-335) **Methods and instrumentation for monitoring airborne radioactivity.** Ryden, R.J. (AERE Harwell, England). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

Techniques and instrumentation developed at Harwell for monitoring airborne radioactivity will be described. The instruments include monitors for airborne actinides and fission products in the working environment; a personal alarm monitor for actinides in the breathing zone of the individual; monitors for actinides, fission products and ^{131}I in gaseous stack discharges; and an instrument for rapidly measuring actinides collected on air-sampler filters. Methods of detecting actinides are summarized here in outline only. 10 references, 3 figures.

48395 (PNL-SA—14225, pp 337-348) **Real time air assay of radionuclides by cryogenics.** Bruns, L.E. (Rockwell Hanford Operations, Richland, WA). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

A real time air assay system has been devised that can obtain gamma-emitting radionuclide concentrations at levels below guideline concentrations. The air to be assayed is liquefied, and a complete capture of gases (krypton, xenon) and aerosols is attained with a 700-fold concentration increase. If this liquefied solution with solids from freeze-out and aerosols is agitated or measured statistically as a thin layer, a 4π geometry detection of the gamma emitters is attained, and with a high-resolution, hyper-pure germanium (HPGe) detector, quantitative results can be realized. Feasibility tests conducted at Science Applications International Corporation, Sorrento, California successfully assayed ^{129}I, ^{133}Xe, ^{131}I, ^{85}Kr and particulate ^{137}Cs. The future program is to design, fabricate, and test a prototype air sampling system. After the prototype is optimized, it will be equipped with the appropriate instrumentation systems and tested at various locations through Hanford (e.g., PUREX stacks). 4 references, 4 figures, 2 tables.

48396 (PNL-SA—14225, pp 349-355) **Personal air sampling at an experimental fuel fabrication line.** Kalos, F.; Johnson, J.R. (Atomic Energy of Canada Ltd., Chalk River, Ontario). Feb 1987. NTIS, PC A16/MF A01. File Number DE87011680. (CONF-8510235—).

From Workplace aerosol monitoring workshop; Napa, CA, USA (28 Oct 1985).

Personal air sampling (PAS) at a mixed-oxide glove-box-line at Chalk River Nuclear Laboratories (CRNL) involves work with ^{233}U and ^{239}Pu, for which the sensitivity of in vivo monitoring is inadequate. The implementation of the PAS program including

equipment, logistics, action levels, and worker exposures recorded from activity on PAS filters is discussed. Initial experience indicates the PAS program provides a better detection of minor activity releases than dose static air sampling. 3 figures.

48397 **(SCPRI-RM—10-1986) Monthly results of measurements, October 1986.** (Service Central de Protection contre les Rayonnements Ionisants, 78 - Le Vesinet (France)). Nov 1986. 59p. (In French). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752582.

This October 1986 report of the SCPRI exposes an interpretation of the principal results concerning the routine monitoring of environmental radioactivity in France: atmospheric dusts, rainwater, surface water, underground water, sewage water, drinking water, food chain (milk, vegetables, fishes), sea water around nuclear plant sites and other sites. The activities of various radioisotopes are presented in tables. This report exposes also the results of special radiation measurements resulting from the Chernobyl accident, with an exceptional control of migratory birds.

48398 **(VTT-TIED—525) Radiation doses due to long-range transport of airborne radionuclides.** Nordlund, G.; Valkama, I.; Rossi, J.; Savolainen, I. (Valtion Teknillinen Tutkimuskeskus, Espoo (Finland)). Dec 1985. 71p. (In Finnish). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752507.

Within the framework of this study a model for estimating the long range transport of radioactive material and for calculating the resultant doses is developed. In the model initially the dispersion paths, i.e. trajectories, of the radioactive matter are calculated from the assumed source areas as well as the dispersion conditions along the trajectories. The trajectories are calculated at three-hour intervals in a two-dimensional grid using numerically analysed winds at a constant pressure level of 850 mb. The dispersion condition parameters applied are: the stability of the atmospheric boundary layer, the so-called mixing height, occurrence of precipitation and the character of the terrain. For each trajectory a type-index value is computed, describing the severity of the possible effects of radioactivity transported by the particular trajectory. The dispersion model uses the information on dispersion conditions provided by the trajectory model to compute the remaining radioactivity in the cloud, the deposition, as well as the doses due to different dose pathways. The pathways used are the external radiation from the cloud and from the activity deposited on the ground, inhalation of radioactive material and ingestion of contaminated food products (milk, meat, green vegetables, grain and roots). In addition to the effects of individual transport incidents, the cumulative probability distributions of the effects of accidental releases of radioactive matter can also be calculated using trajectory statistics and the trajectory type index.

5005 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 47351

5006 Regulations

REFER ALSO TO CITATION(S) 48320, 48364, 48411

48399 **(PB—87-206488/XAB) PM10 SIP (State Implementation Plan) development guideline.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Jun 1987. 163p. (EPA—450/2-86/001). NTIS, PC A08/MF A01.

This guideline document was prepared to describe the actions that must be taken by State and local air pollution control agencies to develop SIPs that demonstrate attainment and maintenance of the PM10 National Ambient Air Quality Standard (NAAQS). The guideline describes how to: (1) demonstrate attainment of the PM10 NAAQS; (2) determine the size of an area exceeding the NAAQS; (3) select a receptor or dispersion model; (4) prepare an emission inventory; and (5) determine a control strategy design concentration. The guideline also discusses ambient PM10 monitoring requirements and data usage and EPA's policies for making the transition from a SIP designed to protect total suspended particulates (TSP) standards to one designed to protect PM10 standards.

48400 **Supplement to management of air quality. Volume VIII.** Stern, A.C. Orlando, FL; Academic Press, Inc. (1986). 197p. Academic Press Inc., Orlando, FL 32887.

This book covers the following topics: air quality management in the United States; United States clean air act litigation; air pollution control programs - worldwide; air pollution personnel and their development; and air pollution standards.

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL

5101 Basic Studies

48401 **(DOE/BP/12871—T1) Reducing losses of nitrogen from duff consumption by prescribed fire in Douglas-fir/western hemlock clearcuts: Final report.** Little, S.N.; Ohmann, J.L. (Forest Service, Portland, OR (USA). Pacific Northwest Forest and Range Experiment Station). 28 Jun 1985. Contract AI79-83BP12871. 28p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013428.

The purpose of this study was to determine if nitrogen loss from prescribed fire can be mitigated by reducing the amount of large fuel on a clearcut prior to burning. We examine the relations between nitrogen loss and duff consumption by prescribed fire with respect to the amount of woody biomass on the unit and the moisture content of that biomass before burn. Equations are presented to predict duff consumption from preburn conditions. Sources of variability of nitrogen concentration and content of duff within and between units are also evaluated.

48402 **(DOE/ER—0312) Microbiology of subsurface environments: Proceedings second investigators' meeting.** (USDOE Office of Energy Research, Washington, DC. Office of Health and Environmental Research). 1986. 29p. (CONF-860998—Summ.). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013094.

From Investigators' meeting on microbiology of deep subsurface environments; Germantown, MD, USA (22 Sep 1986).

The agenda of this meeting was to provide for: (1) general reports by the principal investigators on the initial scientific findings from the Savannah River Site cores; (2) a feedback session during which the principal investigators and others in attendance can provide a critique on how the program can be improved; (3) presentations by scientists on research that may be related to the program. The preliminary scientific results indicate that a diverse, metabolically active microbial community is present in unconsolidated materials to depths of 400 meters below the surface of the Savannah River study site. A thorough characterization of samples revealed that deep subsurface environments are inhabited by microorganisms that range from denitrifying, sulfate-reducing, and methanogenic bacteria to aerobic heterotrophs, autotrophs, fungi, and protozoa. These results have implications in the use of indigenous microorganisms for biological decontamination of deep aquifers or as a biobarrier to contaminant movement, development of strategies to cope with health problems arising from contamination of aquifers by pathogenic microorganisms, reduction of biocorrosion of waste containers planned for storage in deep subsurface environments, and as a source of new organisms or metabolic capabilities for biotechnological applications.

5102 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 47582, 48316, 48331, 48334, 48374, 48376, 48423, 48434

48403 **(AD-A—182108/1/XAB) Migration of hazardous substances through soil. Part 3. Flue-gas desulfurization and fly-ash wastes. Final report, December 1974-July 1977.** Houle, M.J.; Long, D.E.; Weatherhead, D.C.; Bell, R.E.; Ricks, G.K. (Dugway Proving Ground, UT (USA)). May 1987. 475p. (DPG-FR—87-003). NTIS, PC A20/MF A01.

See also Part 1, AD-B023 839L.

The Flue-Gas Desulfurization (FGD) wastes contained high concentrations of boron and fluoride and moderate amounts of arsenic, chromium, copper, lead, nickel, and zinc. The beryllium and cadmium were low and mercury and selenium were very low or not detected. The fly-ash (FA) wastes contain substantial concentrations of boron, chromium, copper, fluoride, lead, nickel, and zinc. The cadmium content was low and beryllium was found in low to moderate concentrations. Mercury was not detected in the FA wastes. Boron and fluoride were found in high concentrations on the FGD supernatant liquor. Except for lead, which was present in low concentrations, the other elements of interest were found in very low concentrations or were not detected. Other elements, such as calcium, potassium, and sodium were found in very high concentrations in the supernatant liquor. The magnesium concentration was low (compared to the other alkaline metals and earths) in most of the FGD waste samples. It was concluded that these nontoxic elements would no doubt affect the removal of the elements of interest from the waste leachate as it passed through soils.

48404 **(LA-UR—87-2644) Migration in alluvium of chlorine-36 and tritium from an underground nuclear test.** Ogard, A.E.; Thompson, J.L.; Rundberg, R.S.; Wolfsberg, K.; Kubik, P.W.; Elmore, D.; Bentley, H.W. (Los Alamos National Lab., NM (USA); Rochester Univ., NY (USA). Nuclear Structure Research Lab.; Argonne National Lab., IL (USA); Hydro Geo Chem., Inc., Tucson, AZ (USA)). 1987. Contract W-7405-ENG-36. 16p. (CONF-870965—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014735.

From International conference on chemistry and migration behavior of actinides and fission products in the geosphere; Munich, F.R. Germany (14 Sep 1987).

This article describes a field experiment studying the migration in alluvium of radioactive elements away from an underground nuclear explosion at the Nevada Test Site in the United States. Nuclides detected in the pumped water are tritium, chlorine-36, iodine-129, and krypton-85 - all at levels below the maximum permissible concentration for drinking water in controlled areas. The chlorine-36 elution curve precedes that of tritium, and is due to an anion exclusion process. A conventional two-dimensional convection-diffusion equation does not fully describe the elution curves for tritium and chlorine-36; the tailing of the curves is longer than predicted. Successful modeling of this experiment will be important for validating codes and models to be used in the high-level nuclear waste program.

48405 **(PB—87-213260/XAB) Gaseous behavior of tce (trichloroethylene) overlying a contaminated aquifer.** Marrin, D.L.; Thompson, G.M. (Tracer Research Corp., Tucson, AZ (USA)). 1987. 10p. NTIS, PC A02/MF A01.

Pub. in Ground Water, Vol. 25, No. 1, 21-27(Jan/Feb 1987).

Shallow soil gas (<2 meters deep) was collected and analyzed for trichloroethylene (TCE) to determine the relationship with ground-water contamination directly below. The gaseous TCE plume was mapped with 46 probes and spanned three orders of magnitude in concentration (<0.001 to 2 mcg/l). TCE concentrations in water from five monitoring wells around the study site ranged from 4 to 2800 ppb and had a correlation coefficient (r) of 0.90 with TCE concentrations in shallow soil gas. Vertical borings were completed to the water table at four locations in order to obtain profiles of soil gas contamination, air porosity, and water saturation. Gaseous diffusion and air/water partitioning are probably the dominant mechanisms involved in transporting TCE from the ground water to the shallow soil gas.

48406 **(STEV-FBT—87-5) Residues from the combustion of waste. Chemical and physical properties.** Hartlen, J.; Elander, P. (Statens Energiverk, Stockholm (Sweden); Statens Geotekniska Inst., Linkoeping (Sweden)). 16 Jun 1986. 54p. (In Swedish). (SGI—1-565-85). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753101.

The main interest was directed to new types of residues as from flue gas cleaning (the dry method and condensation). The results will form the frame for the evaluation of the environmental effects from disposal or utilization of the residues. Leaching tests in the laboratory showed that the leachability is very dependent on the type of residue. The leachates from fly ashes generally have higher concentrations of heavy metals and salts than slags. This is especially pronounced for salts and the following heavy metals: lead, mercury, selenium, vanadium and zink. Leachates from dry flue gas cleaning products (mixed with fly ashes) show higher contents of most salts and heavy metals compared to fly ashes. This especially yields for chlorid, lead, mercury, copper, zink and cadmium. On the other hand, leachates from wet flue gas cleaning products (from flue gas condensation) show lower contents of heavy metals than fly ashes. The leaching tests indicated that dioxines and dibensophuranes are not leachable. A very low detection limit was used, 1 pg/l. The physical properties depend very much on type of residue. This means that the product must be tested in each specific case. Permeability, strength and compactability are of special interest. The risk of swelling must be clarified each time, as it rules the long term properties. Disposal of residues must be handled in a restricted way. Special countermeasures must be taken to cover the residues in a way that the environmental impact can be accepted. If the best disposal technique available is used, the environmental impact will be lower when disposing of combustion residues than of untreated household solid waste.

48407 **Fluids in micropores. I. Structure of a simple classical fluid in a slit-pore.** Schoen, M.; Diestler, D.J.; Cushman, J.H. (Departments of Chemistry and Agronomy, Purdue University, West Lafayette, Indiana 47907). *Journal of Chemical Physics;* **87**: No. 9, 5464-5476(1 Nov 1987).

Equilbrium properties of a rare-gas fluid contained between two parallel fcc(100) planes of rigidly fixed rare-gas atoms were computed by means of the grand-canonical ensemble Monte Carlo method. The singlet distribution function rho/sup (1)/, and the pair-correlation function g/sup (2)/ in planes parallel to the solid layers, indicate that the structure of the pore fluid depends strongly on the distance h between the solid layers. As the separation increases from less than two atomic diameters, successive layers of fluid appear. The transitions between one and two layers and three and four layers are especially abrupt and are accompanied by changes in the character of g/sup (2)/ from dense fluid-like to solid-like. Long-range, in-plane order in the fluid layers diminishes with increasing h, but is still evident in the contact layer (i.e., that nearest the solid layer) at h = 16.5 atomic diameters, the largest separation considered. The structure of the contact layer reflects the solid-layer structure and differs significantly from the adjacent inner fluid layers, whose g/sup (2)/ resembles that of the corresponding bulk fluid. Decreasing the density of atoms in the solid layers blunts the peaks in rho/sup (1)/ and g/sup (2)/, although even for the least dense layer considered the contact layers of fluid evince long-range, in-plane order. Replacing the discrete pairwise fluid—solid interactions with the mean field resulting from smearing the solid atoms over the plane of the solid layer destroys the "phase transitions" and the associated long-range, in-plane order.

5103 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 47207, 47208, 47209, 47210, 47212, 47213, 47227, 47229, 47231, 47232, 47237, 47467, 47471, 48397, 48501

48408 **(CONF-841142—) Environmental research on actinide elements.** Pinder, J.E. III; Alberts, J.J.; McLeod, K.W.; Schreckhise, R.G. (eds.). (Savannah River Ecology Lab., Aiken, SC (USA); Georgia Univ., Sapelo Island (USA). Marine Inst.; Pacific Northwest Lab., Richland, WA (USA); USDOE Office of Scientific and Technical Information, Oak Ridge, TN). Aug 1987. 446p. NTIS, PC A19/MF A01; 1; GPO Dep. File Number DE86008713.

From Symposium on environmental research for actinide elements; Hilton Head Island, SC, USA (7 Nov 1984).

The papers synthesize the results of research sponsored by DOE's Office of Health and Environmental Research on the behavior of transuranic and actinide elements in the environment. Separate abstracts have been prepared for the 21 individual papers. (ACR)

48409 **(SIS—1987:1) Radioactive cesium in grain 1986.** Bjerke, H. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1987. 22p. (In Norwegian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752516.

Measurements of radioactive cesium (/sup 134/Cs and /sup 137/Cs) in grain on the Norwegian market in 1986 are reported. The mean value for imported grain is slightly higher than for grain produced in Norway. The content of /sup 137/Cs in domestic wheat is 2.4 Bq/kg, while samples of imported wheat show a mean value of 3.5 Bq/kg. The dose equivalent for adults in Norway from /sup 134/Cs and /sup 137/Cs in grain is calculated to 6 μSv/year, or 20% of the contribution from the natural occurring nuclide /sup 40/K in the same grain. The transfer factor for cesium from deposition in soil to grain is calculated to 0.5 Bq/kg (kBq/m/sup 2/)/sup -1/.

48410 **Budgets and behaviours of uranium and thorium series isotopes in Santa Monica Basin sediments.** Chihan Huh; Zahnle, D.L.; Small, L.F.; Noshkin, V.E. (Oregon State Univ., Corvallis, USA. Coll. of Oceanography; Lawrence Livermore National Lab., CA, USA). *Geochimica et Cosmochimica Acta;* **51**: No. 6, 1743-1754(Jun 1987).

Nine natural decay-series isotopes were measured in six box cores collected from a transect across the Santa Monica Basin. The ^{210}Pb-derived sedimentation rate decreases from approx. 80 mg/cm^2-yr at the slope to approx. 20 mg/cm^2-yr in the deep central basin. Sediment mixing prevails in sites underlying oxic waters, but is subdued in the anoxic deep basin below the sill depth. Uranium contents in sediments are controlled by levels of authigenic U, which are higher in the more reduced condition in the deep basin. Most of the authigenic U results from precipitation within the sediments. The ^{232}Th-^{228}Th disequilibrium in sediments indicates that ^{228}Ra is lost from the sediments from a depth of approx. 10 cm upward. Modelling the distribution of excess ^{228}Th and ^{234}Th in the surficial layers of the deep basin sediments results in a mean sediment mixing coefficient of 0.2 cm^2/yr and a sedimentation rate close to that based on ^{210}Pb. There is no evidence of changing sedimentation rate in the central basin during the past century. Fluxes of excess ^{210}Pb, ^{230}Th, and ^{231}Pa to the central Santa Monica Basin sediments are much higher than what can be predicted from local supply. Advective input of open ocean waters coupled with enhanced scavenging of these reactive nuclides at the ocean margin is considered to be the primary cause.

5105 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 47055, 47070

5106 Regulations

REFER ALSO TO CITATION(S) 48445, 48447, 48448, 48449

48411 **(DPSP—86-1026) [South Carolina Department of Health and Environmental Control] SCDHEC permit procedures "HOW" manual.** (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant). May 1986. Contract AC09-76SR00001. 415p. NTIS, PC A18/MF A01; 1; GPO Dep. File Number DE87014843.

This report describes processes and procedures for obtaining construction permits at the Savannah River Plant from the South Caroline Department of Health and Environmental Control. (ACR)

48412 **(PB—87-183794/XAB) Superfund Record of Decision (EPA Region 2): Florence Land Recontouring (FLR) landfill, Florence, Mansfield, and Springfield, New Jersey, June 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 27 Jun 1986. 156p. (EPA/ROD/R—02-86/024). NTIS, PC A08/MF A01.

The Florence Land Recontouring (FLR) Landfill is a 60-acre site located on Cedar Lane Extension in the Townships of Florence, Mansfield, and Springfield in Burlington County, New Jersey. The site consists of a 29-acre landfill, two lagoons, a pond and two tanks and is located in a combined residential-agricultural area. The landfill was operated as a solid-waste disposal facility and was permitted to accept sanitary and non-chemical industrial wastes; however, 95 tons of hazardous waste consisting of phthalates, heavy metals, and vinyl chloride monomers were found disposed at the site. Elevated levels of hazardous substance were discovered in soils and groundwater within the landfill. The remedial alternative includes construction of a synthetic membrane and clay composite cap, a circumferential soil/bentonite slurry containment wall, an upgradient ground water interceptor system and a new stormwater management system; leachate treatment and disposal of lagoon liquids and sediments, construction of a partial fence with warning signs; and supplemental sampling of ground water, surface water, and sediments during design. The estimated capital cost for the selected remedy is $8,021,000 with annual O&M costs of $170,000.

48413 **(PB—87-188405/XAB) Superfund Record of Decision (EPA Region 4): A. l. Taylor site (Valley of the Drums), Bullitt County, Kentucky, June 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 4 Sep 1986. 109p. (EPA/ROD/R—04-86/009). NTIS, PC A06/MF A01.

The A. L. Taylor site, also known as Valley of the Drums, is located in a small valley in northern Bullett County outside of Brooks, Kentucky. This site was first identified as a waste-disposal site by the Kentucky Department of National Resources and Environmental Protection (KDNREP) in 1967. Pits were excavated and the contents of drums were emptied into them. Soil from nearby hillsides was eventually used to cover the pits. Thousands of drums were also stored on the surface. There remains an unknown amount of waste buried onsite. The hazardous substances include approximately 140 compounds of the following classes: heavy metals, ketones, phthalates, polychlorinated biphenyls, PCBs, chlorinated alkanes and alkanes, aromatics, chlorinated aromatics, and polynuclear aromitics (PAHs). The remedial action includes removal of pond water, securing pond sediments, installing a final cap cover for containment of the waste materials, constructing a surface water drainage diversion to re-route surface water and a monitoring program. The capital cost is estimated to be $795,349.

48414 **(PB—87-189429/XAB) Superfund Record of Decision (EPA Region 5): Lake Sandy Jo/M and M landfill, Lake County, Indiana, September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 26 Sep 1986. 69p. (EPA/ROD/R—05-86/043). NTIS, PC A04/MF A01.

The Lake Sandy Jo site is located on the southeast side of the City of Gary in Lake County, Indiana. The site was a former 40-acre water-filled borrow pit that was used as a landfill between 1971 and 1980. Various wastes including construction and demolition debris, garage and industrial wastes, and drums are believed to be in the site. The area surrounding the site is primarily low-density residential property. The pit was filled with ground water and was used for a short time as a recreational lake. The primary contaminants of concern are PAHs, phthalates, and heavy metals, found mainly in soils. The remedial action includes installation of a soil cover over the landfill with drainage blanket to control surface seeps; extension of water mains to affected residents in Gary; onsite consolidation of contaminated sediments ground water and surface water/sediment monitoring; and deed restrictions on landfills property and institutional controls on aquifer use. The estimated capital cost is $4,747,000 with annual O&M costs of $63,000.

48415 **(PB—87-189981/XAB) Superfund Record of Decision (EPA Region 1): Baird and McGuire, Holbrook, Massachusetts, September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 30 Sep 1986. 87p. (EPA/ROD/R—01-86/017). NTIS, PC A05/MF A01.

The Baird & McGuire site encompasses approximately twenty acres in Holbrook, Norfolk County, MA. Wetlands occupy approximately 44% of the site with approximately 66% of the site lying within a 100-year flood plain. Baird & McGuire, Inc. (BMI) operated a chemical mixing and batching company from 1912 to 1983. BMI's disposal practices were the source of ground-water and wetlands contamination. In 1983 heavy rains caused a breach of the creosote-collection lagoon resulting in an EPA-initiated Immediate Removal Action. Dioxin, detected in surficial soil samples in 1985, prompted an EPA-initiated second removal response involving the installation of 5700 feet of fencing and extensive soil, ground water, surface water, and air sampling. The primary contaminants of concern include: VOCs, organics, PAHs, dioxin, pesticides, and metals. The remedial action includes excavation in hot areas to remove approximately 191,000 cubic yards of contaminated soils, onsite incineration of excavated soils, ground water extraction and onsite treatment with discharge to an onsite aquifer; restoration of wetlands, construction of levees and ground-water monitoring. The estimated capital costs are $44,386,000 with 30-year O&M costs of $4,132,000.

48416 **(PB—87-190104/XAB) Superfund Record of Decision (EPA Region 1): Auburn Road Landfill, Londonderry, New Jampshire, September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 17 Sep 1986. 45p. (EPA/ROD/R—01-86/018). NTIS, PC A03/MF A01.

The Auburn Road Landfill site, located in the Town of Londonderry, New Hampshire, consists of approximately 200 acres containing four documented hazardous-waste-disposal areas. Although authorized for only municipal refuse, tires, and demolition debris, industrial wastes and 55-gallon steel drums were found. In 1979 the New Hampshire Water Supply and Pollution Control Commission found contamination of surface water and ground water caused by VOCs. Ground water, used as a drinking-water source for approximately 275 homes and 260 mobile homes - all within a one-mile radius of the site is the principal problem of concern. The primary contaminants of concern include: VOCs including TCE, extractable organics, heavy metals, and inorganics. The remedial action consists of extending water service to the effected area from another water-supply works. The estimated cost for this remedy is $2,372,000 with estimated annual O&M of $57,000.

48417 **(PB—87-199550/XAB) ROD (Record of Decision) annual report, FY 1986.** (Booz, Allen and Hamilton, Inc., Bethesda, MD (USA)). Jan 1987. 185p. NTIS, PC A09/MF A01.

The FY86 ROD Annual Report is designed to provide the Regions and Headquarters with summary data on FY86 RODs, and consists of the following sections: Introduction - highlights specific accomplishments in the ROD process. ROD Summaries - describes site conditions and key contaminants, selected remedial actions, specific remedy performance standards and goals, and institutional controls for each FY86 ROD. FY86 ROD Summary Table - summarizes all remedial actions, capital and operation and maintenance costs, contaminated media, and operable unit. Index of Approved Remedial Actions - summarizes selected remedial actions and future operable units for FY82-85 RODs and Enforcement Decision Documents (EDDs). ROD keyword list - provides major keyword categories and their subcategories for all RODs approved to date.

48418 **(PB—87-215463/XAB) Permit guidance manual on unsaturated zone monitoring for hazardous-waste land-treatment units. Final report.** (Environmental Protection Agency, Washington, DC (USA). Office of Solid Waste and Emergency Response). Oct 1986. 160p. (EPA—530/SW-86/040). NTIS, PC A08/MF A01.

See also PB—87-152187; Portions of this document are not fully legible.

The manual provides guidance on unsaturated zone monitoring at hazardous-waste land-treatment units for use by permit applicants and permit writers in developing effective monitoring systems to comply with the Part 264, Subpart M regulations. The manual covers both soil core and soil pore-liquid monitoring, and addresses equipment selection, installation, and operation, sampling procedures, chain of custody considerations, and data evaluation. The installation and sampling procedures are presented in a step-by-step format so that the manual may be more readily used by field personnel. The manual and other EPA guidance documents do not supersede the regulations promulgated under RCRA and published in the Code of Federal Regulations. They provide guidance, interpretations, suggestions, and references to additional information. Also, this guidance is not intended to mean that other designs might not also satisfy the regulatory standards.

52 ENVIRONMENTAL SCIENCES, AQUATIC

5201 Basic Studies

REFER ALSO TO CITATION(S) 47228, 48437, 48544

48419 (EPRI-EA—5202, pp 4.1-4.25) **General review of major species and community dynamics in the Great Lakes.** Kitchell, J.F. (Univ. of Wisconsin, Madison). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

An attempt is made to demonstrate that compensatory responses exhibited by fish populations in the Laurentian Great Lakes are best viewed in a larger ecological context than that of traditional, single-species population biology. Alewife, formerly the most abundant fish in Lake Michigan has recently declined to a small fraction of its former abundance. That has been due largely to a cascade of effects derived from intensified predation by stocked salmonids. Major shifts among the other planktivorous fishes occurred, as might be expected, due to a keystone-predator effect. In addition, the prey of alewife and other planktivorous fishes have exhibited substantial response to altered predation effects as exhibited by paleoecological evidence derived from a sediment core. The enormous sampling programs associated with attempting to assess single species responses in large complex systems suggests that a larger view is more desirable. In particular, a combination of traditional population assessments, which would include the predators, competitors and prey of species of interest, may yield the collective insight and ecological perspective appropriate to management and research activities. These must occur in the context of complex communities operating in systems where responses to manipulation are expressed through a suite of food web interactions. 33 references, 7 figures, 3 tables.

48420 (INIS-mf—10686) Natural isotopic labelling in precipitation and initial formation of groundwater. Svoboda, J. (Heidelberg Univ. (Germany, F.R.). Naturwissenschaftlich-Mathematische Gesamtfakultaet). 1982. 133p. (In German). NTIS (US Sales Only), PC A07/MF A01. File Number DE87752785.

In order to solve hydro-geological questions, particularly the movement and initial formation of groundwater, the movement of water in sand dunes due to the effect of the geological, hydrological and climatic factors was examined. The evaporation was calculated and was checked with the help of stable isotopes, by measuring humidity profiles and isotope concentrations. (HBR).

48421 (NP—7900987) The ecology of Mugu Lagoon, California: An estuarine profile. Onuf, C.P. (California Univ., Santa Barbara (USA). Marine Science Inst.). Jun 1987. 136p. (BR—85(7.15)). US Fish and Wildlife Service, 1010 Gause Blvd., Slidell, LA 70458. File Number TI87900987.

Mugu Lagoon is significant as one of the least disturbed and best protected estuaries in southern California; thus this small estuarine system can serve as a baseline model for the region. This report summarizes and synthesizes scientific data on the ecological structure and functioning of the estuary, including discussions of climate, hydrology, geology, physiography, biotic assemblages, and ecological processes and interactions. The estuary exhibits extreme variability in freshwater inputs, being at times totally marine and at other times flushed by stormwater runoff from the watershed. Major storms in 1978 and 1980 resulted in sedimentation that drastically altered benthic communities and resulted in changes in the distribution of submerged aquatic vegetation and benthos, and fish and shorebird use of these food resources. Mugu Lagoon is part of a naval base and therefore not subject to the development pressures facing many other southern California estuaries. Storm-produced sedimentation remains a management concern, as well as closure of the mouth of the lagoon due to littoral drift of sand along the barrier spit.

48422 (SNV—3084) Forest liming on mineral soils. Results of Finnish experiments. Derome, J.; Kukkola; M.; Maelkoenen, E. (National Swedish Environmental Protection Board, Solna). 1986. 107 p. NTIS (US Sales Only), PC A06/MF A01. File Number DE87753358.

The chemical properties of the soil, nutrient status of the trees and stand production are examined in approximately 20-year-old liming experiment in the study. The material consist of 96 experiments in the pine and spruce stands.The following treatments had been used in the experimints: control, liming (2000 kg limestone/ha), repeated nitrogen fertilization, and liming and nitrogen fertilization together. Liming concidersably increased the amount of organic matter in the humus layer and, correspondingly, decreased it in the uppermost layers of the mineral soil. Owing to the thinner humus layer and coarser soil texture, liming had a greater neutralizing effect on the acidity of the soil in the pine than spruce stands. After liming the amount of exchangeable aluminium dramatically decreased in the soil. Liming reduced the volume growth of the spruce stands on the average by about 10 percent (0.77 m/sub3/ha/a) during the course of the study period (18 a), the corresponding decrease in the pine stands being very small. (authors).

5202 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 47055, 47057, 47065, 47165, 47358, 47582, 47933, 48125, 48316, 48331, 48334, 48365, 48366, 48403, 48405

48423 (AD-A—182481/2/XAB) Waste-water characterization and hazardous-waste survey, Castle AFB, California. Final report, 22-27 September 1986. Binovi, R.D.; Tetla, R.A.; Attebery, C.W. (Air Force Occupational and Environmental Health Lab., Brooks AFB, TX (USA)). May 1987. 41p. (USAFOEHL—87-0063EQ0031EEF). NTIS, PC A03/MF A01.

The USAFOEHL conducted a survey evaluating the industrial wastewater system and hazardous waste program at Castle AFB. The scope of the survey was to: (1) analyze the sewage-treatment-plant spray-field effluent and base surface-water drainage-ditch influent and effluent for NPDES parameters; (2) evaluate oil/water separators, sumps, oil holding tanks, fire training area, oil recovery unit, and the industrial treatment system for characteristic hazardous waste; and (3) evaluate hazardous waste management practices and opportunities of waste minimization.

48424 (DOE/ER/13175—T1) A study of micellar-enhanced ultrafiltration: Final technical report, March 1, 1984-February 28, 1987. Scamehorn, J.F.; Christian, S.D. (Oklahoma Univ., Norman (USA)). Sep 1986. Contract AS05-84ER13175. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014166.

The main focus of research on micellar-enhanced ultrafiltration has been: (1) Systematic investigation of the solubilization of organic compounds having a wide variety of structures and utilization of the results to predict the efficiency of micellar-enhanced ultrafiltration (MEUF) in removing organics from water. (2) Studies of the removal of multivalent inorganic ions from water using MEUF. The emphasis of this work has been on transition metals. Two minor topics of study were: (1) Considerations of the advantages of using surfactant mixtures in MEUF instead of single-surfactant components. (2) Investigation of a new method of recovering surfactant from retentate streams from an MEUF separation, for recycle to the process. A list of publications and presentations, in the form of abstracts, which resulted from this project, are appended.

48425 (EPRI-EA—4952) Sampling guidelines for groundwater quality: Final report. Summers, K.V.; Gherini, S.A. (Tetra Tech, Inc., Lafayette, CA (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 67p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920003.

Accurate, representative groundwater quality data are needed to show compliance with regulatory requirements, to detect releases from existing waste disposal units, and to predict the potential for migration of solutes from disposal sites. Collection of valid data requires selection and adherence to appropriate quality assurance/quality control procedures. Such procedures include preparation of a detailed sampling and analysis plan prior to going to the field, use of sample collection methods appropriate for both the parameters being measured and site hydrogeologic characteristics, and complete documentation of procedures used. This manual provides guidance on selecting appropriate sampling methods and on incorporating QA/QC procedures into sampling activities. For utility waste disposal sites where metals are to be measured in groundwater, well purging and sampling devices are needed which minimize gas transfer. Aeration and degassing can cause pH changes resulting in changes in metal speciation, precipitation or co-precipitation of metals, and changes in the extent to which metals sorb on suspended solids. Suitable well purging devices include bladder, piston, gas-drive, centrifugal, or peristaltic pumps and bailers. Suitable sampling devices include bailers and bladder and piston pumps fitted with in-line filters. Replicate and split samples can be used to distinguish sampling and laboratory-induced variability from true differences between wells. Samples spiked with a known amount of the trace solute to be analyzed help detect matrix interference problems. Distilled, deionized water blanks can be used to detect sample contamination from improper cleaning or handling in the field and laboratory. Prompt, on-going analysis of QA/QC data enables problems to be identified quickly before sampling program integrity is seriously jeopardized.

48426 (EPRI-EA—5202, pp 5.1-5.28) American shad (Alosa sapidissima) population characteristics in the Connecticut River basin in relation to recent fish passage developments. Rideout, S.G. (Fish and Wildlife Service, Hadley, MA). Jun 1987. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI87920470. (CONF-8401120—; CONF-8408220—; CONF-8502155—).

From Workshop on mechanisms of compensatory response of fish populations; Palo Alto, CA, USA (1 Jan 1984).

The construction of impassable dams, pollution and overfishing have most frequently been reported as the cause for declines or fluctuations in the Connecticut River shad population. Primarily as a result of passage of the Anadromous Fish Conservation Act in

1965 and subsequent funding by 1967, the state and federal fishery agencies signed a Statement of Intent to undertake a cooperative fishery program in the Connecticut River basin. This enhancement program is discussed. Other remedial actions are described which have centered on improving water quality and expanding the spawning range of the American shad population in the Connecticut River Basin. 20 references, 1 figure, 13 tables.

48427 **(GKSS—87/E/14) Investigation of material transport and load in tidal rivers.** Fanger, H.U.; Kuhn, H.; Michaelis, W.; Mueller, A.; Riethmueller, R. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.); GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Physik). 1987. 11p. Special print from Water Sci. Technol. (1986) Vol. 18 p. 101-110.

The transport of suspended particulate matter and of heavy metals in tidal rivers is of both ecological and economic relevance. But temporal variabilities and spatial heterogeneities considerably complicate its quantitative treatment by numerical simulation and the acquisition of representative field data for systematic investigations. As a contribution to the potential solution of this problem, a methodology has been developed at the GKSS Research Centre which combines theoretical and experimental techniques in an effective way. A novel measuring system on board a ship allows the fast determination of hydrographic parameters, and water samples are taken in parallel from different depths. Various analytical techniques are applied for quantitative trace-element detection. The experimental data are used as boundary conditions in hydrodynamic and transport model calculations. In the paper, the experimental equipment, techniques, and numerical models are described.

48428 **(GKSS—87/E/16) Measurement of the turbulent impulse- and salt transport in the mixing zone of the river Elbe.** Schroeder, M. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.); Kiel Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet; GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Physik). 11 Feb 1987. 195p. (In German). NTIS (US Sales Only), PC A09/MF A01. File Number DE87753281.

Based on the data of two extense field experiments within the mixing zone of the Elbe estuary the three-dimensional turbulence was studied. The ability of acoustic velocity sensors for measuring turbulent fluctuations in a polluted estuary was successfully tested. During three tidal periods the hydrographic situation is analysed and the characteristics and spectral properties of turbulence are discussed. The development of turbulent kinetic energy and of eddy coefficients in relation to the tidal cycle are shown. With 86 figs., 9 tabs.

48429 **(INIS-mf—10665) Book of tables on the physico-chemical investigation of the Rhine water 1985.** (Internationale Kommission zum Schutze des Rheins gegen Verunreinigung, Koblenz (Germany, F.R.)). 1986. 117p. (In German and French). NTIS (US Sales Only), PC A06/MF A01. File Number DE87752617.

The tables of figures on the physico-chemical investigation of the Rhine water comprise the sampling dates, the organic, entrophying and inorganic substances found, the metals and organic micro-pollutions found, and radioactivity. Other tables indicate the location of measuring places, method of sampling, and method of analysis.

48430 **(PB—87-212692/XAB) Cadmium speciation in aquatic-life flow-through bioassay diluters.** Poldoski, J.E.; Benoit, D.A.; Carlson, A.R.; Mattson, V.R. (Environmental Protection Agency, Duluth, MN (USA). Environmental Research Lab.). Jul 1987. 38p. (EPA—600/D-87/236). NTIS, PC A03/MF A01.

A framework of cadmium-speciation studies is described for flow-through mini-diluter bioassay systems which employs Lake Superior water containing added concentrations of calcium carbonate, Aldrich humic acid and/or less than 2 microns suspended Lake Superior red clay. Aspects of the flow-through diluter function were qualitatively related to major changes in the observed Cd^{2+} concentration as a function of time and different water-quality chemical variables. The most-significant variable was the red clay, which markedly accelerated the rate of loss of Cd^{2+} from Lake Superior water containing added $CaCO_3$. This acceleration factor was highly sensitive to other variables such as pH and humic acid. In addition, ion-selective electrode (ISE) potentiometry, dialysis, and membrane filtration were used to verify an ionic chemical equilibrium model designed to describe various dissolved cadmium-species concentrations.

48431 **(PB—87-214862/XAB) National Surface Water Survey: Western Lake Survey (Phase 1 - synoptic chemistry) quality assurance plan.** Silverstein, M.E.; Drouse, S.K.; Engels, J.L.; Faber, M.L.; Mitchell-Hall, T.E. (Lockheed Engineering and Management Services Co., Inc., Las Vegas, NV (USA)). Jun 1987. 120p. NTIS, PC A06/MF A01.

See also PB—87-182630.

The purpose of the National Surface Water Survey of the National Acid Precipitation Assessment Program is to evaluate the present water chemistry of lakes and streams, to determine the status of certain biotic resources, and to select regionally representative surface waters for a long-term monitoring program to study changes in aquatic resources. The Western Lake Survey is part of the National Surface Water Survey. The U.S. Environmental Protection Agency requires that data-collection activities be based on a program that ensures that the resulting data are of known quality and are suitable for their intended purpose. This quality assurance plan describes in detail the quality-assurance requirements and procedures that are unique to the Western Lake Survey - Phase I.

48432 **(PB—87-214870/XAB) Separation of dilute hazardous organics by low-pressure composite membranes. Final report, April 1985-December 1986.** Bhattacharyya, D.; Barranger, T.; Jevtitch, M.; Greenleaf, S. (Kentucky Univ., Lexington (USA). Dept. of Chemical Engineering). Jul 1987. 189p. NTIS, PC A09/MF A01.

The separation of dilute hazardous organics was accomplished through this project utilizing thin-film composite aromatic polyamide membranes. This technique offers advantages in terms of high solute separation at low pressures (1-2 MPa) and broad pH operating ranges (pH 2 to 12). The synthetic organic-waste solutions used in the study include: polyaromatic hydrocarbons (PAH), phenol, chlorophenols, nitrophenols, and chlorobenzenes. The actual organic waste solution was obtained from the site of a former wood-treatment processing plant in Texas and was known to contain chlorophenols. The membrane showed excellent stability over long periods of time. Standard NaCl rejections were 97-99% and the average pure water flux at 2.068 MPa was about 14 times 10 to the minus 4 power (cu. cm./sq. cm.s).

48433 **(PB—87-214953/XAB) Photolytic ozonation for protection and rehabilitation of ground-water resources: a mechanistic study. Research report.** Peyton, G.R.; Smith, M.A.; Peyton, B.M. (Illinois Univ., Urbana (USA). Water Resources Center). Jan 1987. 66p. (UILU-WRC—87-206). NTIS, PC A04/MF A01.

The cleanup of ground-water resources contaminated by anthropogenic organic compounds is difficult and expensive. Most treatment methods merely transfer the contaminant to another phase, such as an adsorbent or the atmosphere. A treatment process that produces harmless by-products, could be set up on-site, and does not require the transport of hazardous materials is very desirable for such cleanup operations. Photolytic ozonation, the combination of ozone treatment and ultraviolet irradiation, is an oxidative water-treatment process capable of converting almost any organic pollutant completely to carbon dioxide and water. It is potentially a very clean solution to many contamination problems. There has been disagreement in the scientific literature concerning the effectiveness of the process, due largely to a lack of understanding of the chemistry involved. Photolytic ozonation was studied at the laboratory scale, to understand and, if possible, model the complex chemical reaction mechanism, so the process can be more economically optimized.

48434 Lake acidification. Dobson, J.E.; Peplies, R.W.; Rush, R.M. (Oak Ridge National Lab., TN). *Environment;* **29**: No. 5, 2-3(Jun 1987). Contract AC05-84OR21400.

This paper examined a National Research Council (NRC) report called Acid Deposition: Long-Term Trends. The report has been the final word on acid deposition as the cause of acidification of lakes. The authors considered it important that the tentative nature of this report be kept in perspective so that the work of the NRC would promote rather than inhibit scientific inquiry on the lake acidification issue. In this spirit, this report proposed that degradation of storm damaged trees could increase the acidity of the forest humus and as a result the ground water which would fed local streams and lakes. They proposed that extensive forest blowdown could be a factor in acidification of surface waters.

48435 Predictive models and field studies of the fate of complex mixtures. Herbes, S.E. (Environmental Sciences Div., Oak Ridge National Lab., Oak Ridge, TN 37830). pp 172-190 of Environmental hazard assessment of effluents. Bergman, H.L.; Kimerle, R.A.; Maki, A.W. Elmsford, NY; Pergamon Books Inc. (1986). (CONF-8208149—).

From Workshop on hazard assessment for complex effluents; Valley Ranch, WY, USA (22 Aug 1982).

Present emphasis on quantifying likely contaminant levels in the environment before release has shifted the emphasis of field studies toward testing of contaminant fate models. The utility of both mathematical and physical (e.g., microcosm) modeling approaches are discussed in the past. However, few data are obtained to support comparison of these model predictions with contaminant behavior in natural waters, particularly in the case of complex mixtures of contaminants. In this paper, the author examines the interrelationships among physical models, mathematical models, and field studies as they apply to the problem of hazard assessment of complex effluent mixtures. He assumes that one or more components or component fractions of a mixture can be pinpointed as being of biological significance and that the task remaining is to assess their likely fate in a particular environmental setting. He comments on some appropriate and inappropriate uses of field studies and suggest some areas where he believes priorities should be placed in the process of developing reliable models for prediction of contaminant concentrations.

48436 Solubility of mixtures and its application to toxicity. Banerjee, S.; Sugatt, R.H.; O'Grady, D.; Dombrowski, A.E. (Safety and Environmental Protection Div., Brookhaven National Lab., Upton, NY 11973). pp 107-114 of Environmental hazard assessment of effluents. Bergman, H.L.; Kimerle, R.A.; Maki, A.W. Elmsford, NY; Pergamon Books Inc. (1986). (CONF-8208149—).

From Workshop on hazard assessment for complex effluents; Valley Ranch, WY, USA (22 Aug 1982).

In recent years, there has been an increasing tendency to evaluate the environmental behavior and effects of a compound from its physico-chemical properties. The octanol/water partition coefficient (K/sub ow/) is the property that has been used most frequently, and a host of environmental processes such a bioaccumulation, adsorption to sediment, biodegradation, and toxicity are linked to it. A potential difficulty with the use of these correlations is that it is assumed that physical parameters derived for a pure compound can be used to predict the behavior of the compound in the environment, where it is likely to be found as a part of a mixture. Although this assumption may be quite valid in some cases, it may break down in others and it is important to identify both situations. An obvious starting point is the study of solubility, since the measurement is straightforward and the saturation concentration of a compound is its most toxic concentration. In this chapter, the authors discuss some of the available data on the solubility of mixtures in conjunction with their work on the subject, and they illustrate how the results may be applied to the evaluation of the toxicity of mixtures to aquatic organisms.

48437 Uptake of anthropogenic CO_2 by lateral transport models of the ocean based on the distribution of bomb-produced ^{14}C. Peng, T.H. (Oak Ridge National Lab., TN). *Radiocarbon;* **28**: No. 2A, 363-375(1986). Contract AC05-84OR21400.

The pattern of global water column inventories of bomb-produced ^{14}C suggests that a sizeable portion of bomb ^{14}C that entered the Antarctic, northern Pacific, and tropical oceans has been transported to adjacent temperate regions. Models of lateral transport of surface water in the Atlantic, Indian, and Pacific Oceans are based on this distribution pattern. Upwelling of bomb-^{14}C-free water from below takes place in the Antarctic, northern Pacific, and tropical regions; downwelling of surface water occurs in the temperate oceans and northern Atlantic. Uptake of excess CO_2 by these models is calculated using the observed Mauna Loa pCO_2 record as an input function. Results indicate that 35% of fossil fuel CO_2 is taken up by these model oceans during the period 1958-1980. Considering the observed airborne fraction of 0.55, it appears that ca 10% of the global fossil fuel CO_2 is still missing.

5203 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 47207, 47208, 47210, 47212, 47213, 47214, 47225, 47229, 47231, 47237, 47933, 48397, 48408, 48429, 48501

48438 (DOE/EV/10041—1) Coral growth rings and the temporal history of nuclear $^{14}C/C$ and $^{90}Sr/Sr$ in the surface ocean: Final report, June 1, 1982-December 31, 1984. Broecker, W.S.; Cember, R.P.; Toggweiler, J.R.; Trumbore, S.E.; White, J. (Columbia Univ., Palisades, NY (USA). Lamont-Doherty Geological Observatory). Aug 1987. Contract AC02-79EV10041. 72p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014545.

This report summarizes the history and scientific results of the Lamont-Doherty Geological Observatory coral radioisotope project. The report includes abstracts of works in the literature or in preparation resulting from the coral project and a complete listing of the radiocarbon and ^{90}Sr data measured in the course of the project. Also, some possible future research directions for the coral project are suggested.

48439 (PB—87-212437/XAB) Radium removal using sorption to filter sand. Valentine, R.L.; Mulholland, T.S.; Splinter, R.C. (Iowa Univ., Iowa City (USA)). 1987. 9p. NTIS, PC A02/MF A01.

Pub. in Jnl. of American Water Works Association, Vol. 79, No. 4, 170-176(Apr 1987).

This study evaluated the use of a novel sand filtration process that exploits the natural capacity of filter sand to sorb radium through the use of a periodic dilute acid rinse to maintain its sorptive capacity. Batch studies were conducted to determine distribution coefficients so that performance estimates could be made. Laboratory pilot studies using a partially softened ground water showed the process capable of reducing ^{226}Ra concentrations by 80 to 90% in the presence of iron flocs when daily rinsing was practiced using pH 1 (0.36 percent) or pH 2 (0.04 percent) HCl. Similar removals could be achieved in field studies using water containing 9-11 pCi ^{226}R a/L obtained from the existing sand filters in a city whose supply is treated for iron removal. Removals in the field were less when simultaneous iron and radium removal was attempted. In addition, estimates of the total sorptive capacity of the sand obtained in continuous-flow experiments were generally significantly greater than those predicted based on batch results.

48440 (YJT—86-30) Composition of the ground water in bedrock in the Precambrian shield areas of Finland and other countries. Hyyppae, J. (Voimayhtioeiden Ydinjaetetoimikunta, Helsinki (Finland)). Nov 1986. 114p. (In Finnish). NTIS (US Sales Only), PC A06/MF A01. File Number DE87752509.

The main properties of the composition of the ground water contained in the Precambrian bedrock of Finland are presented on the basis of the results of analyses of some 1750 water samples taken from bored wells and a few mines. They show that, with a few exceptions, the waters of bored wells are bicarbonate waters, in which the average total amount of dissolved substances diminishes according to their geographical location as one moves from the coastal areas toward estern and northern Finland. The influence of the mineral composition of the bedrock appears most distinctly in the rapakivi areas, where the average fluoride content of the

ground water varies between 1.5 and 2.0 mg/l and is thus ten times the corresponding content prevailing in areas characterized by other types of rocks. Ground waters containing from 439 to 18.000 mg/l of chloride have also been met with in Finnish bedrock and the location of the sampling site of 38 samples is given together with the general nature of their chemical composition as well as the results of the determinations of the stable (δ "2H, δ "1"8O, δ "3"4S, δ "1"3C) and radioactive ("3H, "1"4C) isotopes of a number of samples. The saline waters are mostly located in the region covered 6000-7500 years ago by the Littorina Sea. On the other hand, the isotopic composition of many saline waters corresponds to that of rainwater fallen during climatic conditions colder than the present. The most saline waters have been met with deep down in mines and deep boreholes, also, for example, far from the region covered by the Littorina Sea. The saline waters contained in Finnish bedrock usually release gas, which in some cases consists mainly of nitrogen but in some places includes significant amounts of methane. In addition, helium is one of the constituents.

5204 Thermal Effluents Monitoring And Transport

REFER ALSO TO CITATION(S) 47278, 47279, 47280, 47281, 47282, 47283, 47284, 47285, 47286, 47287, 47288, 47289, 47290, 47291, 47292, 47293, 47294, 47447, 47448

48441 **(EPRI-EA—5404) Compensatory mechanisms in fish populations: An EPRI research plan: Final report.** Otto, R.G. (Otto (R.G.) and Associates, Reston, VA (USA); Electric Power Research Inst., Palo Alto, CA (USA)). Sep 1987. 78p. Research Reports Center, Box 50490, Palo Alto, CA 94303. File Number TI88920005.

This is a plan for Industry-sponsored research on compensation in fish populations impacted at steam-electric or hydro-power facilities. Compensation encompasses processes by which fishes self-regulate rates of reproduction and mortality as means of offsetting those impacts. EPRI's goal is the synthesis of a quantitative model sufficient to predict the direction and relative magnitude of fish population response to anticipated site specific impacts. Two parallel and interactive research efforts are proposed to meet this goal, a Key Species Program and a Fellowship Program. Both are empirical programs, the first emphasizing the generation of new data sets tailored to the needs of the modeling framework and the second testing and expanding the concepts on which the models are based. The Key Species Program is a series of studies of selected species chosen to represent the range of life history strategies encompassed by the modeling framework. The primary research activity is measurement of key life table parameters (reproduction, growth and mortality) across the geographic range of the test species and under circumstances in which the size or structure of the target populations can be manipulated. The Fellowship Program is a basic research effort to be conducted by senior graduate students working in the area of population dynamics. The Program relies on an oversight group of senior academic and industry scientists to set topical goals for research, oversee the selection and implementation of projects and assist with the consolidation and integration of outputs into the larger predictive framework provided by the Key Species studies.

5205 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 47334, 48426

48442 **(PNL—6041) Columbia River Statistical Update Model, Version 4.0 (COLSTAT4): Background documentation and user's guide.** Whelan, G.; Damschen, D.W.; Brockhaus, R.D. (Pacific Northwest Lab., Richland, WA (USA)). Aug 1987. Contract AC06-76RL01830. 205p. NTIS, PC A10/MF A01; 1; GPO Dep. File Number DE87014968.

Daily-averaged temperature and flow information on the Columbia River just downstream of Priest Rapids Dam and upstream of river mile 380 were collected and stored in a data base. The flow information corresponds to discharges that were collected daily from October 1, 1959, through July 28, 1986. The temperature information corresponds to values that were collected daily from January 1, 1965, through May 27, 1986. The computer model, COLSTAT4 (Columbia River Statistical Update - Version 4.0 model), uses the temperature-discharge data base to statistically analyze temperature and flow conditions by computing the frequency of occurrence and duration of selected temperatures and flow rates for the Columbia River. The COLSTAT4 code analyzes the flow and temperature information in a sequential time frame (i.e., a continuous analysis over a given time period); it also analyzes this information in a seasonal time frame (i.e., a periodic analysis over a specific season from year to year). A provision is included to enable the user to edit and/or extend the data base of temperature and flow information. This report describes the COLSTAT4 code and the information contained in its data base.

48443 **(STF—21A85013) Environmental studies connected with establishing an incinerator plant in Trondheim. 4th quarterly report 1984.** Klokk, T.; Barikmo, J.; Bruteig, I.; Korsen, I.; Moeller, M.; Reinertsen, H.; Schjoldager, J.; Skotvoll, T.; Steinnes, K. (SINTEF, Trondheim (Norway)). Jan 1984. 59p. (In Norwegian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87753069.

The report summarizes various environmental investigations carried out in connection with establishing an incineration plant at Heimdal in Trondheim. All chapters except the chapter on air report the main results from investigations from 1984. The investigation on air quality and wind conditions from 1984 is partly also to be found in 3 previous quarterly reports from 1984. The investigation comprises: 1) Mutagenicity testing. 2) Air quality/wind conditions. 3) Chemical analysis of soil and plants. 4) Description of low vegetation. 5) Chemical analysis of lettuce plants. 6) Bird colonies on garbage dumps. 7) Mercury content in fish. 8) Waste water investigations. 20 tables, 26 drawings.

5206 Regulations

REFER ALSO TO CITATION(S) 48411, 48412, 48413, 48414, 48415, 48416, 48417

48444 **(PB—87-188447/XAB) Superfund Record of Decision (EPA Region 3): Bruin Lagoon Site, Bruin Borough, Pennsylvania (second remedial action), September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 29 Sep 1986. 36p. (EPA/ROD/R—03-86/025). NTIS, PC A03/MF A01.

See also PB—85-213783.

Bruin Lagoon is located about 45 miles north of Pittsburgh in Bruin Borough, Butler County, PA. The commercial and main residential areas of Bruin Borough are located less than five blocks from the site and over 30 residences lie within 500 feet of Bruin Lagoon. Beginning in the 1930s, Bruin Oil Company, located on property adjacent to the site, used the lagoon for disposal of wastes resulting from the production of white oil (mineral oil). Disposal operations continued for more than 40 years. The first remedial action and an immediate emergency action was completed in 1984. EPA, upon completion of the emergency work, determined the need for a reevaluation of the site. Selected remedial actions include onsite stabilization/neutralization treatment of bedrock, dike reinforcement and capping the former lagoon area with a multilayer cap as well as monitoring and maintenance of the site, cap, and ground water. The estimated capital cost is $2,695,000 with annual O&M of $16,000.

48445 **(PB—87-188454/XAB) Superfund Record of Decision (EPA Region 3): Drake Chemical Site (Phase 2), Lock Haven, Clinton County, Pennsylvania (second remedial action), May 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 13 May 1986. 50p. (EPA/ROD/R—03-86/033). NTIS, PC A03/MF A01.

See also PB—85-213791.

The Drake Chemical site is located in Lock Haven, Clinton County, PA. Between 1962 and 1982 Drake Chemical, Inc. (DCI) manufactured batches of specialty, intermediate chemicals for producers of dyes, pharmaceuticals, cosmetics, herbicides, and pesticides. The herbicide Fenac, is a major site contaminant. The eight-acre inactive site contains six major buildings. There are about sixty process tanks used for acids, bases, and fuel oils. Also there are fire

wastewater treatment lagoons. Chemical sludge and contaminated soil cover much of the open area while construction debris is about. The primary contaminants are inorganics and organics including toluene, benzene, TCE, and xylene. The cleanup action includes drainage and removal of the lagoons and treatment of drained liquid and sludge, removal of all tanks, buildings, and debris; decontamination of all metal structures salvagable as scrap; incineration of chemicals and analysis and disposal (if needed) of decontamination fluids. The estimated baseline capital cost for this remedy is $3,143,000.

48446 **(PB—87-188462/XAB) Superfund Record of Decision (EPA Region 6): Odessa Chromium 1, Odessa, Texas, September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 8 Sep 1986. 44p. (EPA/ROD/R—06-86/010). NTIS, PC A03/MF A01.

The Odessa Chromium I site consists of a series of chromium-contaminated wells within 300 acres of residential, commercial and industrial properties and facilities just outside the northwestern city limits of Odessa, Ector County, TX. Nearly every residence or commercial facility is served by one or more water wells completed in the Trinity aquifer which offers the only source of potable groundwater. In 1983, the Texas Department of Water Resources (TDWR) requested the EPA conduct a planned removal action to extend the city water lines to the affected area. The remedial action includes negotiating agreements with the city and consumers to extend the city water system, and construction of a water-distribution system. The estimated capital cost for this action is $247,920 with annual O&M costs of $14,350.

48447 **(PB—87-188470/XAB) Superfund Record of Decision (EPA Region 2): Lang Property, Pemberton Township, New Jersey, September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 29 Sep 1986. 86p. (EPA/ROD/R—02-86/031). NTIS, PC A05/MF A01.

The Lang Property site is a 40-acre parcel of land in a sparsely populated rural area of Pemberton Township, Burlington County, New Jersey. The site is flat, an unpaved access road leads to a 4-acre clearing. Unauthorized disposal of hazardous wastes appears to have occurred over a 2-acre area within the clearing. Abandoned vehicles, tires, and other debris are scattered throughout the site. The site is located within New Jersey's Pinelands National Reserve, a forest expanse nationally recognized as a valuable environmental resource, and is within the 100-year floodplain. In June 1975, 1200-1500 drums of unidentified chemical waste were discovered. In 1976, owners of the property were ordered by the state to remove all drums and contaminated soil. The main contaminants of concern are VOCs and metals, which have contaminated soils, sediments, ground water, and surface water on site. The remedial action includes excavation of contaminated soils and waste material with offsite disposal, extraction and onsite treatment of contaminated ground water, restoration of the excavated area by filling and grading, installation of a security fence and monitoring to ensure remedy effectiveness. Estimated capital costs for the remedy are $2,322,000 with annual O&M costs of $612,000.

48448 **(PB—87-189080/XAB) Superfund Record of Decision (EPA Region 4) Gallaway Ponds Site, Gallaway, Tennessee, September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 26 Sep 1986. 50p. (EPA/ROD/R—04-86/013). NTIS, PC A03/MF A01.

The Gallaway Ponds site is located 2.3 miles northeast of Gallaway, Fayette County, TN. The site lies near a ridge extensively mined for sand and gravel, producing a landscape dotted with water-filled pits up to 50 feet deep. Disposal of hazardous materials probably occurred in the 1970s or early 1980s. In 1983, the EPA conducted an emergency cleanup of Pond 1, consisting of the excavation and offsite disposal of contaminated sludges and the on-site treatment of the water in the pond. The primary contaminants of concern include: pesticides, inorganics, chlordane, and toxaphene. The selected remedial action includes: excavation, proper site closure, dilution of water to meet Ambient Water Quality Criteria, institutional controls, ground-water monitoring, and inspection and maintenance of the cap. The estimated capital cost is $344,735 with 30-year O&M present-worth costs of $163,265.

48449 **(PB—87-190096/XAB) Superfund Record of Decision (EPA Region 2): Marathon Battery Company site, Cold Spring, Putnam County, New York, September 1986. Final report.** (Environmental Protection Agency, Washington, DC (USA)). 30 Sep 1986. 106p. (EPA/ROD/R—02-86/037). NTIS, PC A06/MF A01.

The Marathon Battery Company (MBC) site, located in the Village of Gold Spring, Putnam County, NY, has two components: the East Foundry Cove Marsh (EFCM), and Constitution Marsh. The site began as a battery-manufacturing plant in 1952, producing military and commercial batteries for a period of 27 years. Approximately 50,000 kg of cadmium were discharged into the EFCM as a result of MBC's wastewater-treatment system. In 1965 the New York State Department of Health ordered the plant to disconnect its industrial discharge from the Village's sanitary sewer upon concluding that the battery plant's process effluent could not be managed by a new proposed sewage-treatment system. The primary contaminants of concern include: cadmium, cobalt, and nickel. The remedial action for the EFCM component of the site includes hydraulic dredging of sediments; sediment chemical fixation; dredging, water treatment and disposal, marsh restoration, and long-term monitoring. The estimated capital cost for both remedial components is $16,640,000 with O&M costs of $3,530,000 for the first year; $180,000 for years 2-5; and $127,000 for years 6-30.

53 ENVIRONMENTAL-SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

5301 Social And Economic Studies

REFER ALSO TO CITATION(S) 47098, 47127, 47159, 47160, 47161, 47586

5302 Assessment Of Energy Technologies

48450 **How fair is safe enough? The cultural approach to societal technology choice.** Rayner, S.; Cantor, R. (Oak Ridge National Lab., TN). *Risk Analysis;* 7: No. 1, 3-9(Mar 1987).

This paper consists of an argument and a pilot study. First is a general, perhaps philosophical, argument against the National Academy's viewpoint that dealing with risk is a two-stage process consisting of (a) assessment of facts, and (b) evaluation of facts in sociopolitical context. They argue that societal risk intrinsically revolves around social relations as much as around evaluations of probability. Second, they outline one particular approach to analyzing societal risk management styles. They call this the fairness hypothesis. Rather than focusing on probabilities and magnitudes of undesired events, this approach emphasizes societal preferences for principles of achieving consent to a technology, distributing liabilities, and investing trust in institutions. Conflict rather than probability is the chief focus of this approach to societal risk management. This view is illustrated by a recent empirical pilot study that explored the fairness hypothesis in the context of new nuclear technologies.

55 BIOMEDICAL SCIENCES, BASIC STUDIES

REFER ALSO TO CITATION(S) 47933

5502 Biochemistry

REFER ALSO TO CITATION(S) 47995, 48489

48451 (LBL-PUB—615, pp A.29-A.34) **Study of the role of macrophages in the inhibition of erythropoiesis.** Rodriguez, A.M. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

The authors know that Inerleukin-1 (IL-1) causes an inhibition in the formation of red blood cells. They also know that macrophages produce IL-1. They want to see if the inhibition of erythropoiesis in malarial-infected mice is a result of the malarial parasite or the activation of macrophages and the resulting production of IL-1 by the malaria parasite. To study this they are going to make a spleen cell suspension from mice infected with malaria and separate the macrophages from the suspension by adherence to a plastic surface. They are then going to detach the adherent cells with lidocaine. These cells will then by used in a Krystal assay for erythropoiesis by adding varying numbers of the adherent cells (.04ml of 5.00000, 2.50000, 1.30000, .63000, .32000 cells/ml) to .04ml of a suspension of spleen cells from phenylhydrzine treated mice (12,500,000 cells/ml) with 125mU/ml of erythropoietin.

48452 (LBL-PUB—615, pp A.209-A.213) **Procollagen secretion and synthesis.** Proctor, M. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

The primary goal of this research is to possibly identify a procollagen receptor on the outside of the cell. Collagen has a unique structure and synthesizing process. Vital data are gathered by performing a series of experiments using cell cultures and extraction, a collagenase assay, and a electrophoresis.

48453 **Orientation and linear dichroism characteristics of porphyrin-DNA complexes.** Geacintov, N.E.; Ibanez, V.; Rougee, M.; Bensasson, R.V. (New York Univ., NY). *Biochemistry;* **26**: No. 11, 3087-3092(2 Jun 1987). Contract AC02-78EV04959.

The linear dichroism spectra of complexes of tetrakis(N-methyl-4-pyridinio)porphine (H_2TMpyP) and its zinc(II) derivative (ZnTMpyP) with DNA oriented in a flow gradient have been investigated. The dichroism of H_2TMpyP determined within the Soret band and the Q/sub y/ band system is consistent with an intercalative conformation in which the plane of the porphyrin ring system is nearly parallel to the planes of the DNA bases. In the case of ZnTMpyP on the other hand, the porphyrin ring system is inclined at angles of 62-67° with respect to the axis of the DNA helix. The pyridyl groups in both cases are characterized by a low degree of orientation with respect to the axis of the helix. In contrast to H_2TMpyP which does not significantly affect the degree of alignment of the DNA in the flow gradient, the binding of ZnTMpyP causes a significant decrease (about 50% for a base pair/ZnTMpyP ratio of 20) in the intrinsic dichroism at 260 nm due to the oriented DNA bases; the binding of ZnTMpyP to DNA either gives rise to regions of higher flexibility or causes bends or kinks at the binding sites. Increasing the ionic strength has little influence on the linear dichroism of the ZnTMpyP-DNA complexes, but the number of molecules bound at intercalation sites diminishes in the case of the H_2TMpyP-DNA complexes; the accompanying changes in the linear dichroism characteristics suggest that external H_2TMpyP complexes are formed at the expense of intercalation complexes. Taken together, these linear dichroism results are consistent with the intercalative model for H_2TMpyP-DNA and the external binding model for ZnTMpyP-DNA complexes proposed by Fiel et al and Pasternack et al.

48454 **Binding of HeLa cell nuclear proteins to a human chromosome 9 specific repetitive DNA sequence.** Grady, D.; Robinson, D.; Moyzis, R. (Los Alamos National Lab., NM). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2172(1 May 1987). (CONF-870644—).

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

In order to investigate DNA-protein interactions in defined chromosome regions, the authors have initiated studies to detect the specific binding of proteins from a crude HeLe cell nuclear extract to a cloned human chromosome 9 specific satellite III DNA sequence. Approximately 150,000 copies of this sequence, representing 0.23% of human DNA, are localized in chromosome region 9qh. Using a band retardation assay, in which the migration of a radiolabeled DNA probe is altered by protein binding, two discrete DNA-protein complexes were observed. Kinetic analysis of the formation and dissociation of these two complexes suggests that the slower migrating complex may be a dimer of the faster migrating complex. Competition experiments, in which these specific DNA-protein complexes are formed in the presence of increasing amounts of E. coli, pBr 322, or poly d(I-c) DNA indicate that the HeLa nuclear protein(s) has an approximately 20,000 fold greater affinity for the chromosome 9 specific DNA sequence. Preliminary experiments indicate that the formation of these specific DNA-protein complexes are not blocked by either cloned Alu repetitive DNA sequences, or a related chromosome 16 satellite II repetitive DNA sequence. This suggests that some nuclear proteins may have distinct chromosomal locations.

48455 **Monoclonal antibodies to drosophila cytochrome P-450's.** Sundseth, S.S.; Kennel, S.J.; Waters, L.C. (Univ. of Tennessee-Oak Ridge Graduate School of Biomedical Sciences). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2142(1 May 1987). (CONF-870644—). Contract AC05-84OR21400.

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

Hybridomas producing monoclonal antibodies were prepared by the fusion of SP2/0 myeloma cells and spleen cells from a female BALB/c mouse immunized by cytochrome P-450-A and P-450-B purified from Drosophila Hikone-R (BG) microsomes. P-450-A and P-450-B are electrophoretically distinct subsets of Drosophila P-450. P-450-A is ubiquitous among strains tested, while P-450-B is present in only a few strains displaying unique enzyme activities and increased insecticide resistance. The Oregon-R strain contains only cytochromes P-450-A and is susceptible to insecticides. The authors Hikone-R (BG) strain expresses both cytochromes P-450-A and P-450-B and is insecticide resistant. Antibody producing hybridomas were detected in a solid-phase radioimmunoassay (RIA) by binding to Hikone-R (BG) or Oregon-R microsomes. Four independent hybridomas were identified as producing monoclonal antibodies that recognized proteins in the P-450 complex by immunoblot experiments. Three monoclonal antibodies recognized P-450-A proteins, while one monoclonal antibody bound predominantly P-450-B. This monoclonal antibody also recognized southern armyworm (Spodoptera eridania, Cramer) microsomal proteins.

48456 **Subunit interactions of ribulose bisphosphate carboxylase/oxygenase as determined by chemical cross-linking and site-directed mutagenesis.** Lee, E.H.; Soper, T.S.; Hartman, F.C. (Oak Ridge National Lab., TN). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2167(1 May 1987). (CONF-870644—).

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

Ribulose bisphosphate carboxylase/oxygenase from Rhodospirillum rubrum is a homodimer of 50-kDa subunits. Although a high-resolution 3D structure of the enzyme has not yet been reported, recent work from their laboratory with 4,4′-diisothiocyano-2,2′-disulfonate stilbene demonstrated an intrasubunit distance of 12 A between the active-site lysines at positions 166 and 329. To continue mapping distances between residues in the active-site region, they have modified the enzyme with 4,4′-difluoro-3,3′-dinitrophenyl sulfone, which spans 9 A. The inactivated carboxylase exhibits an unaltered molecular weight as judged by gel filtration, thereby excluding intermolecular cross-linking. However, in the presence of urea, gel filtration reveals a prominent species of 100-kDa, attributed to intersubunit cross-linking. The major chromophoric peptide has been isolated from a tryptic digest of the 100-kDa material. Sequence analyses reveal that the intersubunit cross-link occurs between Cys-58 and active-site Lys-166. In contrast to other substitutions by site-directed mutagenesis, replacement of Lys-166 with Asp prevents association of the two subunits, presumably as a consequence of repulsive forces between the thiolate and carboxylate anions. These observations suggest that each catalytic site may consist of residues from both subunits.

48457 Hexagonal bilayer structures formed by three out of the four subunits of the extracellular hemoglobin of Lumbricus terrestris. Kapp, O.H.; Mainwaring, M.G.; Vinogradov, S.N.; Crewe, A.V. (Univ. of Chicago, IL). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2266(1 May 1987). (CONF-870644—).

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

A fraction of the extracellular hemoglobin of Lumbricus terrestris, obtained by gel filtration at neutral pH subsequent to dissociation either at pH 9.8 or at pH 4.0 or at pH 7.0 in 10 mM sodium phosphotungstate, consisting of the three subunits D1 (31 kDa), D2 (37 kDa) and T (50 kDa), produced two peaks when subjected to FPLC on a Superose 6 column at neutral pH. Peak I, eluting at a slightly greater volume than the native hemoglobin, consisted of reassociated hexagonal bilayer structures when examined by scanning transmission electron microscopy. The dimensions of the three reassociated hexagonal bilayer structures were 25 nm x 16 nm. Although the latter are smaller than the dimensions of the native hemoglobin, 30 nm x 20 nm, the diameter of the central cavity remained unchanged. Subtraction of the digitized and averaged images of the reassociated forms from those of the native hemoglobin suggested that the spatial localization of the fourth subunit, subunit M (16.7 kDa), was limited primarily to the periphery of the molecule.

48458 Control of mouse liver ornithine aminotransferase synthesis (OAT). Burcham, J.M.; Peraino, C. (Argonne National Lab., IL). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2233(1 May 1987). (CONF-870644—). Contract W-31-109-ENG-38.

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

Control of hepatic OAT synthesis by dietary protein and diurnal cycling was studied by using Western blots, in vitro translation of free polysomes, and slot blots of total liver RNA. Western blots showed that animals maintained on an 85% casein diet had higher levels of OAT protein than mice fed a 20% casein diet. Slot blots of total liver RNA from animals on either diet did not indicate a commensurate increase in OAT mRNA levels in animals on the high casein diet. Western blots of livers from mice maintained on a 12-hour light and 12-hour dark cycle did not show differences in the level of OAT protein. However, OAT synthesis by in vitro translation of free polysomes was several fold higher when polysomes isolated at the beginning of the light period were used. Corresponding measurements of OAT mRNA in slot blots of total liver RNA did not show any differences in OAT mRNA levels between the light and dark periods. These results suggest that the control of OAT synthesis in mouse liver by dietary protein and diurnal cycles is primarily at the level of translation.

48459 Properties of human O^6-methylguanine-DNA methyltransferase. Bhattacharyya, D.; Boulden, A.M.; Foote, R.S.; Mitra, S. (Oak Ridge National Lab., TN). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2257(1 May 1987). (CONF-870644—).

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

The premutagenic base, O^6-methylguanine, is repaired in the DNA of both bacterial and mammalian cells by stoichiometric transfer of the methyl group to a protein cysteine residue. The human O^6-methylguanine-DNA methyltransferase has been extensively purified from placenta and partially characterized with respect to reaction kinetics, pH and temperature dependencies, and the effects of salt, metal ions, and DNA concentration. The methyltransfer reaction has apparent second-order kinetics and an energy of activation, calculated from temperature-dependence studies, of approximately 18 kcal. The reaction rate is optimal at a pH of about 8.5. Chromatofocusing experiments indicate a pI of 6.2 for the methyltransferase. Like the E. coli and rodent methyltransferases, the human protein has no cofactor requirements. The reaction is significantly inhibited by physiological concentrations of NaCl. Both single- and double-stranded DNA also inhibit the reaction, presumably by nonspecific binding of the protein. Changes in the human methyltransferase due to its reaction with O^6-methylguanine were examined by chromatofocusing and binding to DNA-cellulose. The results were compared with those obtained in parallel experiments using purified methyltransferase from E. coli.

48460 Transcriptional promoter and enhancer elements in the long terminal repeats (LTR) of endogenous murine leukemia virus (MuLV)-related proviral sequences. Ch'ang, L.Y.; Myer, F.E.; Yang, D.M.; Koh, C.K.; Yang, W.K. (Oak Ridge National Lab., TN). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2133(1 May 1987). (CONF-870644—). Contract AC05-84OR21400.

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

Mouse genome harbors 2 families of MuLV-related proviral sequences, which do not directly produce infectious virus, but may express RNA transcripts in a tissue-specific manner. The LTRS of MuLV-related sequences contain a mid-U3 inserted segment (IS) of ~ 200 bp not found in the LTR of infectious MuLVs. To test for the LTR promoter and enhancer activities, chloramphenicol acetyltransferase (CAT) gene, alone or carrying SV40 promoter, was linked to various LTR sequences of 2 MuLV and 6 representative MuLV-related DNA clones and the recombinant genes were examined for transient CAT expression in mouse NIH-3T3, mink CCL64 and human HT1080 cells by DNA transfection. While the CAT expression was high with the 2 ecotropic MuLV LTRs, very little to undetectable activities were obtained with all MuLV-related LTRs. To determine the basis for the very low activity of the MuLV-related LTRs, series of experiments were performed, which indicate that the TATA- and CCAAC-containing domain, downstream of the IS, is functionally intact as a promoter and that the IS sequences, while inactive as a promoter by itself, could provide a bidirectional enhancer-like activity to its own or MuLV LTR or SV40 promoter. Further studies suggest the presence of a cis-acting negative regulatory element in sequences upstream of the IS in both the 2 subfamilies of MuLV-related LTRs.

48461 Mechanisms of acylation for alkyllysophospholipids. Lee, T.C.; Blank, M.L.; Fitzgerald, V.; Snyder, F. (Oak Ridge Association Univ., TN). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2126(1 May 1987). (CONF-870644—). Contract AC05-76OR00033.

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

Acylation of lyso-GPC in normal cells proceeds by: (1) CoA-independent transacylation, (2) CoA-dependent transacylation, and (3) acyl-CoA dependent acylation. Using a newly developed HPLC method, they have studied the mechanisms for acylation of alkyllyso-GPC and alkyllyso-GPE in Fischer R-3259 sarcoma microsomes. CoA-independent transacylation was the predominant pathway for the acylation of alkyllyso-GPE, since the total extent of acylation was not enhanced by the addition of CoA alone or by CoA, ATP, and Mg^{2+}. In contrast, both a CoA-independent and a CoA-dependent transacylation were observed for the acylation of alkyllyso-GPC. Moreover, shorter incubation times and higher protein and lower substrate concentrations favored the formation of polyunsaturated molecular species in the transacylation reaction. In general, CoA-independent transacylation produces a high percentage of polyunsaturated molecular species; acyl-CoA dependent acylation generates the least polyunsaturated molecular species and CoA-dependent transacylation gives intermediate values. No substrate selectivity occurred with respect to alkyl chain lengths of alkyllyso-GPE; similar molecular species composition was obtained with either hexadecyllyso-GPE or octadecyllyso-GPE as substrates. Their results emphasize the complexity of the turnover in fatty acids at the sn-2 position of alkyllysophospholipids.

48462 Qualitative and quantitative changes in exoskeletal proteins synthesized throughout the molt cycle of the Bermuda land crab. Stringfellow, L.A.; Skinner, D.M. (Oak Ridge National Lab., TN). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2135(1 May 1987). (CONF-870644—).

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

During the premolt period in Crustacea, a single layer of epidermal cells that underlies the exoskeleton is thought to be responsible for the degradation of the old exoskeleton and synthesis of a new one. In order to identify molt-specific proteins and their temporal appearance, they cultured epidermis and associated integumentary tissue from the gill chambers of crab in vitro in the presence of one of three radiolabeled amino acids. Autoradiographs of [^{35}S]Met-labeled tissues indicate a low level of synthesis in epidermal cells of intermolt animals; synthesis increases during premolt and stage B of postmolt. Label is also found in the innermost layer of the old exoskeleton while it is being degraded and in new exoskeletal layers during their synthesis. Fluorographs of gels of integumentary proteins show marked quantitative changes in 44 and 56 kD proteins late in premolt. Qualitative changes include synthesis of 46 and 48 kD proteins during late premolt and three proteins (all of ~ 170 kD) detectable only in postmolt. Solubilized gel slices of [^{3}H]Leu-labeled proteins indicate maximum synthesis at an earlier premolt stage than seen in Met-labeled proteins. Other proteins of 20, 24, 29, 32, and 96 kD are synthesized in a stage-dependent manner while [^{3}H]Tyr labels small proteins that appear only in late premolt.

5503 Cytology

REFER ALSO TO CITATION(S) 48489

5504 Genetics

48463 (LBL-PUB—615, pp A.215-A.225) **Genetic recombination during mitosis and meiosis of Saccharomyces cerevisiae.** Tribune, D. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

This research project involved the analysis of the red and white cycloheximide resistant segregants from the control strain RX38. YPD MASTERS numbered 1-18 were prepared from cycloheximide resistant red and white segregants on synthetic cycloheximide medium using sterile techniques and grown at 24°C for two days. Each YPD master was replica plated to synthetic diagnostic media and sporulation media. The goal of the experiment was to check for gene conversion and recombination on Chromosome VII and intergenic recombination on Chromosome II between heteroalleles LYS, TYR and HIS. Results in the diploid RX38 showed 25% crossing over during mitosis at the TRP loci which is the same as Interval I of Rec46. The mitotic and meiotic map distances, 25, Interval I and 35, Interval II, respectively for RX38 were the same. In another experiment, the heteroalleles LYS, TYR and HIS gave no crossing over results. The results obtained thus far are not complete, the research study is still being conducted.

5505 Metabolism

REFER ALSO TO CITATION(S) 48531

48464 **(INIS-mf—10679) Diaplacental transfer of /sup 14/C ethanol in pregnant albino rats at various stages of gestation.** Haberl, E. (Muenchen Univ. (Germany, F.R.). Fakultaet fuer Biologie). 7 Mar 1983. 120p. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87752793.

The kinetics of an acutely small dose of ethanol was studied for the first time in this paper. The kinetics of the ethanol during the elimination phase were ascertained during the early as well as late stages of development. The kinetic study is supplemented by measurements of the activity concentration in the exhaled air of the pregnant animals and by gas chromatographic determinations of blood alcohol concentration.

5506 Medicine

REFER ALSO TO CITATION(S) 48084, 48986, 48987

48465 **(DOE/ER/60561—1) New techniques for positron emission tomography in the study of human neurological disorders for the period June 15, 1987 through December 14, 1987.** Kuhl, D.E. (Michigan Univ., Ann Arbor (USA). Div. of Nuclear Medicine). Sep 1987. Contract FG02-87ER60561. 5p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014663.

A brief progress report is presented describing the preparation of ^{11}C-scopolamine, ^{17}F-fluoromethane and ^{18}F-tetraalkylammonium fluoride. The application of ^{11}C-scopolamine to map cholinergic receptors in normal human brain. Additional studies entitled "The Automated Arterial Blood Sampling Systems for PET" and "Investigations of Array Processor Based High-Speed Parameter Estimation for Tracer Kinetic Modeling" are also described. (DT)

48466 **(DOE/ID/12605—T1) Low-level radioactive wastes resulting from medical activities: A nontechnical guide.** Weir, G.J. Jr. (American Coll. of Nuclear Physicians, Washington, DC). Jul 1986. Contract FG07-85ID12605. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014502.

This report provides a brief, non-technical, largely historical guide to the definition, handling, and disposal of low-level radioactive wastes generated by medical activities rather than the nuclear fuel cycle. (TEM)

48467 **(DOE/NBM—7014503) Characteristics of medically related low-level radioactive waste.** Weir, G.J. Jr.; Teele, B. (ed.). (American Coll. of Nuclear Physicians, Washington, DC). Jul 1986. Contract FG07-85ID12605. 64p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014503.

This report describes a survey that identified the current sources of medically generated radioactive wastes. Included are recommendations on how to reduce the volume of medically-related material classified as low-level radioactive wastes, to improve handling techniques for long-lived radioisotopes, and for options for the use of radioactive materials in medical studies. 8 refs., 11 tabs. (TEM)

48468 **(INIS-mf—10668) Influence of CT control examinations on the irradiation planning for patients with cerebral metastases.** Haumann, S. (Technische Hochschule Aachen (Germany, F.R.). Medizinische Fakultaet). 12 Feb 1986. 71p. (In German). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752622.

The thesis is aimed at reviewing a therapy plan worked out previously for the treatment of patients with cerebral metastases, and at studying computerized tomography for its potential benefit in the planning and implementation of radiotherapy. 61 patients were irradiated and examined neurologically and by CT before, during and after treatment, thus allowing a thorough-going analysis of the findings. CT evaluations differentiated between the change of volume and the number of metastases as well as the change of the extension of perifocal oedema. Our experience shows a dose of 30 Gy related to the centre of the skull to be sufficient, on the one hand, in order to determine by CT whether or not the existing intracerebral tumour metastases of the patient concerned will be accessible by radiotherapy at all, and, on the other hand, to destroy metastases smaller than 5 mm which cannot be detected by CT.

48469 **(INIS-mf—10695) Effects of various forms of mastitis, in the progesterone concentrations of cow milk and milk fat, as determined by RIA and EIA.** Hoedemaker, M. (Tieraerztliche Hochschule Hannover (Germany, F.R.)). 16 Dec 1982. 102p. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87752786.

The progesterone concentration in milk fat was determined in milk samples taken from 39 cows with a corpus luteum and an

average blood plasma progesterone concentration of 15.35 +- 6.26 nmole/l. The samples were collected mornings and evenings from each of the four quarters at the end of milking. 29 animals had healthy as well as diseased udder quarters. In 10 animals all four quarters were affected. There was no statistically significant difference in the progesterone concentration in the milk and in the milk fat, between the normal and affected secretion. There was also no correlation between the various forms of mastitis, causative agent, secretion findings or leucocyte content and the clinical finding in the udder quarter. Of a total of 156 samples investigated with the milk progesterone test (normal as well as affected secretion), 9 samples contained less than 5 ng progesterone/ml milk, which was set as the lower limit for evidence of the presence of an active corpus luteum. Using this lower limit, 5.8% were false negative results when compared with the actual status of the ovary. Eight of the nine secretion samples with less than 5 ng progesterone/ml milk from cows with an active corpus luteum, were from udder quarters affected with mastitis. It is probable that there is a causal relationship between the mastitis and the low progesterone content in the milk. The milk fat progesterone determination was carried out by means of the RIA and EIA. A comparison of the progesterone concentration in the milk fat and in the milk from the milk samples taken in the morning and evening demonstrated no statistically significant differences.

48470 (INIS-mf—10956) **South African Association of Physicists in Medicine and Biology: 25. Anniversary Congress, 18-22 March 1985, Cape Town.** (South African Association of Physicists in Medicine and Biology, Pretoria). 1985. 48p. (In Afrikaans and English). (CONF-8503143—). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269.

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

The twenty-fifth anniversary congress of the South African Association of Physicists in Medicine and Biology was held from 18-22 March 1985 in Cape Town. The tremendous growth of nuclear energy and radiation technology in South Africa led to an increasing need for biophysicists, especially health physicists, for the application of radioisotopes and radiation as well as nuclear power, including the uranium industry. Papers delivered on the conference covered subjects like medical physics, radiotherapy, radiopharmaceuticals, radiation protection, the calibration of radiation monitors, radiation detectors, radiation doses and dosimetry.

48471 (INIS-mf—10956, pp 42) **Equivalent photon energy in computed tomography.** Pistorius, S. (Tygerberg Hospital, Bellville, South Africa. Dept. of Medical Physics). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48472 (INIS-mf—10956, pp 41) **Determination of normal TC-99 thyroid uptake with different background corrections.** Pretorius, P.H.; Van Aswegen, A.; Otto, A.C.; Herbst, C.P.; Loetter, M.G.; Minnaar, P.C. (University of the Orange Free State, Bloemfontein, South Africa). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48473 (INIS-mf—10956, pp 44) **Treatment of mycosis fungoidis by low energy x-rays.** Hartkamp, A.; Savage, D.J. (Verwoerd, H.F. Hospital, Pretoria, South Africa). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48474 (INIS-mf—10956, pp 40) **Simulation of platelet kinetics.** Loetter, M.G.; Heyns, A.duP.; Minnaar, P.C.; Wessels, P.; Snyman, E.; Kotze, H.; Pieters, H. (University of the Orange Free State, Bloemfontein, South Africa). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48475 (LBL-PUB—615, pp A.193-A.208) **Tumor radiobiology.** Moman, A.A.L. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

The purpose of this research is to evaluate the responses of rat rhabdomyosarcoma tumors to heavy-ion irradiation. In vivo and in vitro experiments are used to determine these responses. Some of the present areas of study include: 1) repair of potentially lethal damage, 2) tumor repopulation kinetics following fractionated doses of heavy ions, and 3) phase-specific cell survival following X irradiation.

48476 (SIS—1987:4) **Radiation hygiene analysis of medical activities in Norway. Integral dose: A basis of X-ray examination consequence calculations.** Olerud, H.M. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1987. 152p. (In Norwegian). NTIS (US Sales Only), PC A08/MF A01. File Number DE87752522.

A computer program for the evaluation of radiation protection parameters connected to diagnostic X-ray examination has been developed. For a selected X-ray examination the program picks out key values from a data base containg patient observations and calculates integral doses, collective doses and injury cases. When the volume of the data base is sufficient large, a total consequence analysis of diagnostic X-ray activities in Norway will be carried out. 71 refs.

48477 (ZfK—590, pp 52) **Scintiscanning of the miniature swine myocardium with [/sup 99m/Tc(DMPE)/sub 2/Cl/sub 2/]Cl.** Syhre, R.; Seifert, S.; Muenze, R.; Mohnike, W.; Schmidt, J.; Bach, H.; Buschik, P.; Rohde, E. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Akademie der Wissenschaften der DDR, Berlin-Buch. Zentralinstitut fuer Herz-Kreislaufforschung; Akademie der Wissenschaften der DDR, Berlin. Inst. fuer Wirkstofforschung). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48478 **Turnover of brain monoamine oxidase measured in vivo by positron emission tomography using L-[^{11}C]deprenyl.** Arnett, C.D.; Fowler, J.S.; MacGregor, R.R.; Schlyer, D.J.; Wolf, A.P.; Langstroem, B.Ha.; Halldin, C. (Brookhaven National Lab., Upton, NY). *Journal of Neurochemistry;* **49**: No. 2, 522-527(Aug 1987).

The distribution of carbon-11-labeled L-deprenyl, an irreversible inhibitor of monoamine oxidase type B (MAO-B), was determined in the baboon brain by positron emission tomography. The irreversible blood-to-brain transfer constant (influx constant, Ki) was measured using a complete metabolite-corrected arterial plasma concentration curve. This influx constant was used as a measure of functional enzyme activity for sequential determinations of MAO-B recovery following a single high dose of unlabeled L-deprenyl. The half-life for turnover of MAO-B was thus determined to be 30 days. Using appropriate irreversible inhibitors, this procedure should be generally useful for determining enzyme turnover rates in any organ in vivo and can be applied to some human studies as well.

48479 Serial PET studies of human cerebral malignancy with [1-^{11}C]putrescine and [1-^{11}C]2-deoxy-D-glucose. Hiesiger, E.; Fowler, J.S.; Wolf, A.P.; Logan, J.; Brodie, J.D.; McPherson, D.; MacGregor, R.R.; Christman, D.R.; Volkow, N.D.; Flamm, E. (Brookhaven National Lab., Upton, NY). *Journal of Nuclear Medicine;* **28**: No. 8, 1251-1261(Aug 1987).

Serial PET measurements of [1-^{11}C]putrescine ([^{11}C]PUT) uptake and glucose metabolic rate (GMR) using [1-^{11}C]2-deoxy-D-glucose ([^{11}C]2DG) were made on eight human subjects with a radiological and, in most cases, pathological diagnosis of primary or metastatic brain tumor. Blood-to-brain influx constants (Ki) were calculated for [^{11}C]PUT. Tumor uptake of ^{11}C after [^{11}C]PUT injection was unidirectional peaking at 15 min. The mean +/- s.d. Kis for [^{11}C]PUT for tumor and normal brain tissue were 0.78 +/- 0.045 and 0.024 +/- 0.007 ml cc-1 min-1, respectively (average of ratio, 3.11 whereas the ratio of GMR for tumor and normal brain tissue was 1.2 +/- 0.5. The mean Ki for four active, high grade astrocytomas was 0.098 +/- 0.030 in contrast to 0.027 +/- 0.008 ml cc-1 min-1 for two patients with low grade astrocytoma. Active high grade astrocytomas also showed marked CT contrast enhancement and regional glucose hypermetabolism. In one subject with brain metastases, both [^{11}C]PUT and GMR correlated with a declining clinical picture in repeated studies over a 4-mo period. PET studies with [^{11}C]PUT provide a better signal:noise ratio than GMR measurements, are useful for locating small glycolytically hypometabolic tumors and, when used in longitudinal studies in a single subject, appear to provide an index of degree of malignancy.

48480 Design, synthesis and evaluation of 2-deoxy-2-iodovinyl-branched carbohydrates as potential brain imaging agents. Goodman, M.M.; Callahan, A.P.; Knapp, F.F. Jr. (Oak Ridge National Lab., TN). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-1, 1269-1270(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

Radioiodinated carbohydrates such as 2-deoxy-2-iodo-D-glucose and 3-deoxy-3-iodo-D-glucose undergo facile chemical or in vivo deiodination which precludes their use as radiotracers of glucose metabolism in tissues. To overcome the problems resulting from in vivo deiodination, we explored the concept of stabilizing radioiodide on a model carbohydrate, (E)-C-3-iodovinyl-D-allose as an iodovinyl moiety. This agent did not exhibit brain specificity but showed low in vivo deiodination which demonstrated for the first time that radioiodide can be stabilized on a carbohydrate. The goal of this study was to develop a deoxy-branched carbohydrate with radioiodide stabilized as a vinyliodide with the objective of achieving high brain uptake.

48481 Radiohalogenated low-density-lipoprotein: potential agents for the visualization of atherosclerotic lesions. Moerlein, S.M.; Dalal, K.B.; Yano, Y.; Ebbe, S.; Lindgren, F.T.; Budinger, T.F. (California Univ., Berkeley; Lawrence Berkeley Lab., CA). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1307-1308(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

The in vivo localization of low density lipoprotein (LDL) labeled with sup(99m)Tc and ^{123}I indicates that LDL labeled with the gamma-emitter ^{123}I or the positron-emitters ^{124}I, ^{75}Br, or ^{76}Br may be useful for imaging atherosclerotic lesions with SPECT or PET. Although the radioiodination of LDL has been reported, neither the radioiodination nor radiobromination of LDL has been optimized. Methods are described for achieving optimum radiochemical yields of 42-48% for radioiodinated LDL, with corresponding radiobromination yields of 25-30%.

48482 Design, synthesis and evaluation of redox radiopharmaceuticals: a potential new approach for the development of brain imaging agents. Srivastava, P.C.; Knapp, F.F. Jr. (Oak Ridge National Lab., TN). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1329-1331(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

The goals of this paper are to describe the fabrication and complete evaluation of a dihydropyridine <- -> pyridinium salt type redox system for the delivery of radioiodinated agents to the brain. Tissue distribution studies of ^{125}I-labeled 4-iodoaniline and the redox agents were performed in rats. [^{125}I]Iodoaniline initially showed moderate brain uptake with subsequent release of the radioactivity from the brain. [^{125}I]Iodoaniline, however, when coupled to a dihydropyridine carrier showed significantly higher uptake and retention in the brain.

48483 Improved generator for the production and use of ^{212}Pb and ^{212}Bi. Atcher, R.W.; Gansow, O.A.; Friedman, A.M.; Hines, J.J. (National Cancer Institute, Bethesda, MD; Argonne National Lab., IL). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1377(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

48484 Synthesis and direct estrogen receptor binding affinity of sup(80m)Br-labeled 1,1-BIS(p-hydroxyphenyl)-2-bromo-2-phenylethylene. Mease, R.C.; DeSombre, E.R.; Hughes, A.; Friedman, A.M.; Seevers, R.H. (Argonne National Lab., IL; Chicago Univ., IL; Michael Reese Hospital, Chicago, IL). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1397-1399(Oct-Dec 1986). (CONF-8606111—). Contract W-31-109-ENG-38.

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

Estrogen receptor (ER) binding radiopharmaceuticals have potential for use in the diagnosis and treatment of cancers of the female reproductive system. The synthesis of sup(80m)Br-labelled 1,1-BIS(p-hydroxyphenyl)-2-bromo-2-phenylethylene (BDPE) is described giving a 65% radiochemical yield with a mean specific activity of 150Cimmole. sup(80m)Br-BDPE was shown to bind strongly with rat uterine ER in vitro.

48485 Synthesis of ^{11}C-labelled tracers for studies of functional MAO activity in brain using PET. Halldin, C.; Fowler, J.; Bjurling, P.; MacGregor, R.; Arnett, C.; Wolf, A.; Langstroem, B. (Uppsala Univ., Sweden; Brookhaven National Lab., Upton, NY). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1400-1402(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

To investigate the use of PET in the study of monoamine oxidase (MAO) enzyme dynamics and disease, we have synthesized the inhibitors clorgyline and L-deprenyl labelled with ^{11}C. Another approach for studies of functional MAO activity is to use substrates for MAO. Dimethylphenethyl amine (DMPA), might be used as radiotracer for in vivo measurement of MAO-B activity and was therefore labelled with ^{11}C, both in the methyl and the phenethyl group. Methylphenethyl amine (MPA) was also labelled with ^{11}C.

48486 Positron-emitting analogs of SCH 23390 for the study of dopamine D1 receptors. DeJesus, O.T.; Moffaert, G.J.C. Van; Cooper, M.D.; Woolverton, W.L.; Friedman, A.M. (Chicago Univ., IL; Argonne National Lab., IL). *Journal of Labelled Compounds and Radiopharmaceuticals;* **23**: No. 10-12, 1403-1404(Oct-Dec 1986). (CONF-8606111—).

From 6. international symposium on radiopharmaceutical chemistry; Boston, MA, USA (29 Jun 1986).

With the discovery of benzazepines as selective D1 ligands either as agonists or antagonists, studies on the function of D1 receptors and the functional significance of multiple classes of DA receptors are actively being pursued in several laboratories. We have prepared two positron emitting analogs of SCH 23390 in order to assess its potential as imaging agents in positron emission tomography (PET).

5509 Pathology

REFER ALSO TO CITATION(S) 48522

48487 (LBL-PUB—615, pp A.35-A.48) **Effect of thromobocytopenia on atherosclerosis in rabbits with dietary hypercholesterolemia.** O'Neill-Gonzalez, J. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

Research has been undertaken to study if blood platelets can affect in some way the deposition of lipids on arteries and, therefore, their possible role in the occurrence of atherosclerosis. The experimental design followed includes subjecting the animal model (rabbit) to a high cholesterol and peanut oil diet for eight weeks. A certain number of these animals were also treated with a guinea pig anti-rabbit serum (Aps) or normal guinea pig serum (Ngps) during the last four weeks of the eight week treatment. Through this experiment, the authors wish to study the platelets in the rabbit's blood and the role that the platelets play in the production of arteriosclerotic disease interacting in the areas where the vessel walls are damaged, and in studying if changes occur in the amount of lipid deposited in the wall of the aorta.

48488 (LBL-PUB—615, pp A.147-A.160) **Effect of thrombopoetic substances on megakaryocyte metabolism.** Velez-Garcia, C. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

Megakaryocytes are large cells produced in the bone marrow which eventually mature into platelets. Platelets are circulating anucleate cells involved in thrombosis and hemostatis. In order to understand the control of platelet production, studies will be done with a source rich in thrombopoetin. Thrombopoetin is a poorly defined substance which is known to induce megakaryocytopoiesis. It has been shown that a fraction of plasma from thrombocytopenic rabbits (rabbits with a low platelet count) can stimulate thrombopoiesis in vivo. No direct effect of thrombopoetin on mature megakaryocytes has been previously demonstrated, therefore the experiments and data to follow are a significant contribution to basic knowledge in the mechanisms of platelet formation through their precursors: megakaryocytes. There is little known about megakaryocytes due to the difficulty in obtaining sufficient quantities of cells for biochemical analysis. As this obstacle is overcome, the following areas are under investigation: megakaryocyte maturation, morphology, and metabolism. The authors have studied two major metabolic activities of megakaryocytes: Lactic Acid output by the cells and glucose uptake, both in presence of normal and thrombocytopenic rabbit plasma.

5510 Physiological Systems

48489 (INIS-mf—10680) **Autoradiographic and cytochemical studies on the intracellular transport of secreted proteins in the lacrimal ducts (glandula extraorbitalis) of the rat.** Vogel, H. (Muenchen Univ. (Germany, F.R.). Fakultaet fuer Biologie). 25 May 1982. 100p. (In German). NTIS (US Sales Only), PC A05/MF A01. File Number DE87752792.

Azini was isolated from the glandula lacrimalis of the rat. Its vitality was proven by oxygen use measurements. In autoradiographic studies isolated Azini was marked with L-(4,5-/sup 3/H)-leucine and fixed at various times thereafter. The light microscopic autoradiography showed a time dependent distribution of the silver grains whose association with membrane-enclosed compartments made the electron microscopic autoradiography possible. This distribution allows an analysis of the kinetics of the intracellular transport of secreted proteins. Because of its limited spatial resolution the autoradiographic research methods were combined with the cytochemical presentation of the peroxidase, a secreted protein, of the lacrimal duct.

48490 (INIS-mf—10956, pp 41) **Effect of vigorous short term exercise on the splenic platelet pool.** Roodt, J.; Wessels, P.; Pretorius, P.H.; Heyns, A.duP.; Loetter, M.G. (University of the Orange Free State, Bloemfontein, South Africa). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

5520 Public Health

REFER ALSO TO CITATION(S) 47193, 48319, 48336, 48337, 48338, 48339, 48340, 48341, 48342, 48343, 48344, 48345, 48350, 48351, 48352, 48353, 48528, 48529

48491 (LBL—23189) **Illustrations of a density-equalizing map projection technique.** Selvin, S.; Merrill, D.; Schulman, J.; Shaw, G.; Benson, W.; Mohr, M. (Lawrence Berkeley Lab., CA (USA); California Univ., Berkeley (USA). Dept. of Biostatistics; California Birth Defects Monitoring Program, Berkeley (USA)). Apr 1987. Contract AC03-76SF00098. 43p. NTIS, PC A03. File Number DE87013992.

To analyze geographic clusters of disease, one must consider varying population density. Customary methods, for example calculation of rates for subregions, are unsatisfactory: if subregions are too large, geographic detail is lost; if too small, stable rates cannot be calculated. In either case, adjacency relationships among cases are not easily analyzed. The usual difficulties are avoided by using an innovative projection technique. On a transformed map, population density is equalized while preserving adjacency relationships, so that clusters of cases can be easily recognized and their statistical significance measured. A density-equalizing computer algorithm is briefly described, and its use illustrated in representative applications. 11 refs., 30 figs.

5530 Agriculture And Food Technology

REFER ALSO TO CITATION(S) 47672

48492 (CEA-CONF—8842) **Effect of irradiation and exposure to nitrogen on the mortality of adults. Tribolium confusum J. du V.** Buscarlet, L.A.; Aminian, B.; Bali, C. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Service de Radio-Agronomie). Sep 1986. 12p. (CONF-8609298—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752606.

From ESNA congress; Tel Aviv, Israel (21 Sep 1986).

For insect control irradiation can be improved by combination with other methods in order to limit the dose and hence to preserve the sensory qualities of some foods like fresh fruits, or to kill more rapidly the adult stage for avoiding the risk that a shipment be rejected because of the presence of living insects. The effect of irradiation with long exposure to inert gas has not been reported yet. This study presents preliminary results on Tribolium confusum. Irradiation alone from 120 to 1000 Gy killed 100% of adults T. confusum in 12 to 15 days. At 60 Gy 10% insects were living after 28 days and at 40 Gy no mortality was observed. Mortality of adults T. confusum observed 10 days after exposure to nitrogen increased with the exposure time. 100 % mortality was reached for 17 hours exposure. When insects were exposed to nitrogen before or after irradiation synergic effects were observed. The greatest efficiency was obtained when insects were irradiated at 600 Gy after 9 hr exposure. When insects were exposed to nitrogen during irradiation the protective effectt of a short exposure (1/2 hr) was observed only for low doses (< 60 Gy). For a long exposure (9 hr) early irradiation at 600 Gy was more efficient than late irradiation.

48493 **(CEA-CONF—8883) Point of view about identification of irradiated foods by electron spin resonance.** Saint-Lebe, L.; Raffi, J. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Service de Radio-Agronomie). Nov 1986. 12p. (CONF-8611168—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752609.

From Workshop on identification of ionized products and dosimetry of treatment; Neuherberg, F.R. Germany (17 Nov 1986).

Principles and conditions required for using electron spin resonance (ESR) in identifying irradiated foods are first put forth. After a literature review, examples of irradiated cereals and French prunes are described in order to derive general conclusions concerning the future of ESR in this field.

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

5601 Radiation Effects

REFER ALSO TO CITATION(S) 48523

48494 **(AD-A—182622/1/XAB) AFFRI (Armed Forces Radiobiology Research Institute) reports, January, February, March 1987. Technical report.** (Armed Forces Radiobiology Research Inst., Bethesda, MD (USA)). Apr 1987. 88p. NTIS, PC A05/MF A01.

Includes Rept. nos. AFRRI-SR87-1 through AFRRI-SR87-9 and AFRRI-TR86-4.

Contents include: effect of radiation dose on the recovery of aerobic and anaerobic bacteria from mice; sodium-hydrogen exchange system in LLC-PK1 epithelium; a sodium-hydrogen exchange system in isolated apical membrane from LLC-PK1 epithelia; effects of ethanol on the functional properties of sodium channels in brain synaptosomes; radioprotection by interleukin-1; cytokines in radioprotection - comparison of the radioprotective effects of IL-1 to IL-2, GM-CSF and IFN gamma; dithiothreitol elicits epileptiform activity in Ca1 of the guinea pig hippocampal slice; resistance of after hyperpolarizations in hippocampal pyramidal cells to prostaglandins and vasoactive intestinal polypeptide (VIP); kinetic flow dichroism study of conformational changes in supercoiled DNA induced by ethidium bromide and noncovalent and covalent binding of benzo alpha pyrene diol epoxide; and reference dosimetry for 1986 NATO battlefield dosimetry intercomparisons at the Army Pulsed Radiation Facility.

48495 **(AD-A—182861/5/XAB) Radiation injury to the canine thymus lymphohematopoietic stem cells - correlation with functional deficits. Technical report, 22 February 1984-30 November 1985.** Nold, J.B.; Benjamin, S.A.; Miller, G.K. (Colorado State Univ., Fort Collins (USA)). 4 Jun 1986. 156p. NTIS, PC A08/MF A01.

Immunologic and hematopoietic responses were studied in dogs following prenatal or neonatal irradiation to evaluate the effects of ionizing radiation on the developing lymphohematopoietic system. Pregnant beagle dams received abdominal Co-60 gamma radiation exposures (200 R) or sham-irradiations at 35 days of gestation. Offspring from a second group of dams received 173 R whole-body gamma radiation or sham-irradiation at 10 days of age. The mean calculated dose to each fetus or neonate was 1.5 Gray. These data show that prenatally or neonatally-irradiated dogs have significant postnatal immunologic and hematopoietic defects. The observation of altered lymphocyte subpopulations suggests altered immunoregulation and raises some important questions relating to radiation-induced immunodeficiency and increased susceptibility to clinical disease, including neoplasia.

48496 **(CEA-CONF—8890) Gastrointestinal transfer of neptunium (V) in newborn baboons: preliminary results.** Metivier, H.; Duserre, C.; Jouniaux, B.; Fritsch, P.; Lataillade, G.; Masse, R. (CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)). Nov 1986. 7p. (CONF-861123—8). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752597.

From CEC/CEA international workshop on age-related factors in radionuclide metabolism and dosimetry; Angers, France (26 Nov 1986).

To measure gastrointestinal neptunium absorption, baboons aged from 17 hours to 26 days were gavaged with an oral dose of 0.002 ug/kg of neptunium-239 nitrate. Absorption ranged from 3.71 to 0.113 per cent of the gavaged dose which was, 88 to 3 times higher than the values for adults. This range was reduced to 41 to 3 when doubtful results were discarded because of possible lung contamination. Absorption was expressed in terms of retention per animal at killing since collection of urine and faeces from neonates was not possible. For the same animals the skeleton/liver ratio of the neptunium burden rose continuously in the 26 dav-old baboon and reached twice the mean adult value.

48497 **(INIS-mf—10649) Growth of hemopoietic precursor cells (CFU-C) of adriamycin-treated or whole-body-irradiated dogs with or without bleomycin in vitro.** Volkamer, A. (Muenchen Univ. (Germany, F.R.). Fachbereich Tiermedizin). 24 Feb 1984. 51p. (In German). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752461.

The effect of the cytostatic drug bleomycin (BLM) on the growth of canine hemopoietic stem-cells in vitro was tested in order to detect a stem-cell deficiency after in vivo-treatment with adriamycin (ADM) or whole-body-irradiation. Stem-cells damaged by irradiation or cytostatics are suppressed by bleomycin-induced strand-breaks in vitro. After stem-cell recovery the increased sensitivity towards bleomycin can no longer be detected. After whole-body-irradiation and cytostatical treatment the stem-cells who remained intact have to compensate the quantitative change of the stem-cells by increased proliferation. The proliferating cells show a particular bleomycin-sensitivity. Especially after irradiation a long persistence of the bleomycin-sensitivity can be reckoned on.

48498 **(INIS-mf—10651) Experimental investigations into the effects of irradiation with neutron and gamma rays on the immune system, as demonstrated at the model of immunity of Salmonella typhimurium on the mouse.** Hahn, H. (Muenchen Univ. (Germany, F.R.). Fachbereich Tiermedizin). 22 Feb 1985. 72p. (In German). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752463.

Mice were irradiated with neutron and gamma rays (with a dose of 200 rad respectively 300 rad). Either 24 hours before or after the irradiation the mice were vaccinated and revaccinated with a Salmonella typhimurium vaccine. By ELISA, IHA and BTZD-test specific antibodies against Salmonella typhimurium could be found. The 200 rad irradiated animals had a lower increase in the formation of antibodies compared with mice not irradiated, if the irradiation was applied before the immunisation. On the 300 rad irradiated animals a reduction of the formation of the antibodies could be observed, too. The antibody titres, however, were higher and an earlier increase of the number of the antibodies was found in comparison with the 200 rad irradiated animals. A second antigene application after 7 days and an irradiation after the first respectively the second immunisation gave no noticeable proof of immune suppression. In our tests it was found out, that for the definition of the antibody titres of the sera the ELISA and the IHA had been more sensitive than the BTZD-test.

48499 **(INIS-mf—10673) Experimental investigation into the effects of irradiation with mixed neutron-gamma-rays on the immune system as demonstrated by the model of immunity to Staphylococcal Enterotoxin B in rabbits.** Kraus, W. (Muenchen Univ. (Germany, F.R.). Fachbereich Tiermedizin). 27 Jul 1984. 77p. (In German). NTIS (US Sales Only), PC A05/MF A01. File Number DE87752780.

Using the model of immunisation of rabbits with Staphylococcal Enterotoxin B the influence of neutron radiation on the antibody response was investigated. Four groups were formed, which differed by the moment of irradiation with regard to the moment of immunisation and re-immunisation, and were irradiated with neutron-rays of 200 rad and 300 rad doses. Both doses were each given before and after vaccination, respectively before and after re-vaccination. The antibody response has been evaluated by the Radio-Immuno-Assay (RIA): Neutron-radiation given 24 hours before vaccination effects a stronger immune suppression than given 24

hours after vaccination. By pre-antigenic radiation a secondary immune response is more suppressed than by radiation following the antigen; the recovery of lymphoid tissue, however, takes place in a shorter time than in case of radiation before or after a primary vaccination. The secondary antibody response to a re-vaccination is not influenced by a subsequent neutron-radiation. The formation of secondary antibodies is not as radiosensitive as the formation of primary ones. By a neutron-radiation preformed antibodies are hardly damaged.

48500 (INIS-mf—10956, pp 47) **Tritium exposure problems from an accelarator gas target.** Bain, C.A.R. (Nuclear Development Corp. of South Africa, Pty. Ltd., Pelindaba, Pretoria). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48501 (LBL—23235) **Annual environmental monitoring report of the Lawrence Berkeley Laboratory, 1986.** Schleimer, G.E. (ed.). (Lawrence Berkeley Lab., CA (USA)). Apr 1987. Contract AC03-76SF00098. 52p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87013969.

The Environmental Monitoring Program of the Lawrence Berkeley Laboratory is described. Data for 1986 are presented and general trends are discussed. Topics include radiation monitoring, wastewater discharge monitoring, dose distribution estimates, and ground water monitoring. 9 refs., 8 figs., 20 tabs.

48502 (LBL-PUB—615, pp A.161-A.167) **Aspects of radiation research.** Cobbins, R.B. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

The Radiation Biophysics Group of the Lawrence Berkeley Laboratory is involved in an approach to understand the harmful effects of a wide array of ionizing radiations. The BEVALAC accelerator is the sole source of accelerated heavy particles, from protons to uranium ions. This group is the core of the worldwide effort to discover the undiscovered aspects of ionizing radiation. A research project called SKYHOOK was initiated in order to test the hypothesis that LET (linear energy transfer) was a sufficient predictor for life shortening and that low-energy charged particles with an LET approximately the same as that for fission neutrons would produce quantitatively similar life-shortening results after single or multifractionated doses. Another purpose was to study life shortening, using high doses, over a LET range from less than one to approximately two hundred keV's per micrometer. In pursuit of these goals, CB6Fl mice were given total-body irradiation of various charged particles. These exposures were done at the BEVELAC.

48503 (LBL-PUB—615, pp A.189-A.192) **Cellular and molecular radiobiology of charged particle radiation damage.** Jacobs, P.C. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

An attempt has been made to measure the effect of novobiocin on exponentially growing .human cells. Secondly, an attempt has been made to measure the inhibition of potentially lethal damage (PLD) repair after x-rays in exponentially growing cells by novobiocin. Thirdly, the author measured the effect of novobiocin on PLD-repair after exposure to Bragg peak helium ions. These procedures were conducted using sterile tissue culture techniques essential for maintaining human cells in vitro.

48504 (ZfK—590, pp 53-54) **Testing of substances affine to the myocardium by use of perfused isolated rat heart and / sup 99m/Tc-DMPE complexes.** Kampf, G.; Kieback, P. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48505 (ZfK—590, pp 54-56) **Preparation, testing of uptake by the isolated rat heart and preliminary results of tissue distribution of [/sup 99m/Tc]technetium(I)-hexakis(t-butylisonitril), a potential perfusion indicator for myocardial demonstration.** Knop, G.; Kampf, G. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48506 (ZfK—590, pp 56-59) **Autoradiographic studies on tissue distribution of /sup 99m/Tc(I) and /sup 99/Tc(I)-DMPE complexes in the rat.** Kretzschmar, M.; Seifert, S. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48507 (ZfK—590, pp 59-61) **Whole-body autoradiography of [/sup 14/CH/sub 3/]DMPE distribution in the rat.** Kretzschmar, M.; Kloetzer, D.; Maeding, P.; Muenze, R.; Seifert, S. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48508 (ZfK—590, pp 62-64) **Whole-body autoradiography as screening test for myocardial affinity of organic cations. 2.** Guethert, I.; Kretzschmar, M. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48509 (ZfK—590, pp 66-68) **Stability of /sup 99m/Tc-DTPA-HSA.** Beyer, R.; Syhre, R.; Noll, B. Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48510 (ZfK—590, pp 101-102) **Connections between physicochemical properties and biokinetics of tumoraffine M-ligand complexes.** Schomaecker, K.; Beyer, G.J.; Mocker, D.; Richter, K.; Franke, W.G.; Gottschalk, A.; Hertwig, C. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Medizinische Akademie, Dresden, German Democratic Republic. Nuklearmedizinische Klinik). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48511 **Proposal for a generally applicable de minimis dose.** Kocher, D.C. (Oak Ridge National Lab., TN). *Health Physics;* **53**: No. 2, 117-121(Aug 1987).

This paper presents a proposal for a generally applicable de minimis radiation dose for members of the general public. A de minimis dose defines a level below which control of radiation exposures would be deliberately and specifically curtailed. Thus, such a dose must be set well below established limits on acceptable dose from all sources of exposure and, furthermore, must be below any established dose limit for specific practices. The proposed de minimis level consists of two dose limits: a principal limit on annual committed effective dose equivalent averaged over a lifetime of 0.01 mSv (1 mrem) and a subsidiary limit on committed effective dose equivalent in any year of 0.05 mSv (5 mrem). The proposed values are 1% of the limits on acceptable dose from all sources currently recommended by the International Commission on Radiological Protection (ICRP85), and correspond to a lifetime risk from continuous exposure of about 10(-5).

48512 **Electron dose-rate conversion factors for external exposure of the skin from uniformly deposited activity on the body surface.** Kocher, D.C.; Eckerman, K.F. (Oak Ridge National Lab., TN). *Health Physics;* **53**: No. 2, 135-141(Aug 1987).

Dose-rate conversion factors have been calculated for external exposure of the skin from electrons emitted by sources that are deposited uniformly on the body surface. The dose-rate factors are

obtained from electron scaled point kernels developed by Berger. The dose-rate factors are calculated at depths of 4, 8, and 40 mg cm-2 below the body surface as recommended by Whitton, and at a depth of 7 mg cm-2 as recommended in ICRP Publication 26 (ICRP77). The dependence of the dose-rate factors at selected depths on the energy of the emitted electrons is displayed. The dose-rate factors for selected radionuclides of potential importance in radiological assessments are tabulated.

48513 **Rapid assay for cell age response to radiation by electronic volume flow cell sorting.** Freyer, J.P.; Wilder, M.E.; Raju, M.R. (Los Alamos National Lab., NM). *International Journal of Radiation Biology and Related Studies in Physics, Chemistry and Medicine;* **52**: No. 1, 91-106(Jul 1987).

A new technique is described for measuring cell survival as a function of cell cycle position using flow cytometric cell sorting on the basis of electronic volume signals. Sorting of cells into different cell age compartments is demonstrated for three different cell lines commonly used in radiobiological research. Using flow cytometric DNA content analysis and [^{3}H]thymidine autoradiography of the sorted cell populations, it is demonstrated that resolution of the age compartment separation is as good as or better than that reported for other cell synchronizing techniques. Variation in cell survival as a function of position in the cell cycle after a single dose of radiation as measured by volume cell sorting is similar to that determined by other cell synchrony techniques. Advantages of this method include: (1) no treatment of the cells is required, thus, this method is noncytotoxic; (2) no cell cycle progression is needed to obtain different cell age compartments; (3) the cell population can be held in complete growth medium at any desired temperature during sorting; (4) a complete radiation age - response assay can be plated in 2 h. Applications of this method are discussed, along with some technical limitations.

48514 **Radiation-induced DNA single-strand breaks in the intestinal mucosal cells of mice treated with the radioprotectors WR-2721 or 16-16 dimethyl prostaglandin E_2.** Hanson, W.R.; Grdina, D.J. (Rush-Presbyterian Saint Luke's Medical Center, Chicago, IL; Argonne National Lab., IL; Chicago Univ., IL). *International Journal of Radiation Biology and Related Studies in Physics, Chemistry and Medicine;* **52**: No. 1, 67-76(Jul 1987).

Both S-2-(3-aminopropylamino) ethylphosphorothioic acid (WR-2721) and 16-16 dimethyl prostaglandin E_2 (dm PGE_2) protected the intestinal clonogenic cells to some degree from the effects of ^{137}Cs γ-irradiation. Dsub(o) was increased from 1.1 to + -0.12 Gy in controls to 1.55 + = 0.48 Gy in 16-16 dm PGE_2 treated and 2.12 + -0.20 Gy in WR-2721 treated mice. Both agents increased the shoulder of the clonogenic-cell survival curve. The effects of these different radioprotectors were measured on radiation-induction of DNA single-strand breaks in cells comprising the murine intestinal mucosa. The number of DNA single-strand breaks increased with increasing doses of γ-rays in animals killed immediately after exposure. WR-2721 reduced the number of initial radiation-induced DNA single-strand breaks when given one-half hour before exposure, (maximum protection). In contrast, 16-16 dm PGE_2 given 1 hour before irradiation (time of maximum protection from radiation cytotoxicity) did not reduce the number of initial DNA breaks. Both impeded the rate of rejoining of DNA breaks with increasing time after irradiation. The relationship between these effects on the rate of strand rejoining and cell survival is unknown.

48515 **CNS cancers and radiation exposure: a case-control study among workers at two nuclear facilities.** Carpenter, A.V.; Flanders, W.D.; Frome, E.L.; Crawford-Brown, D.J.; Fry, S.A. (Oak Ridge Associated Universities, TN). *JOM, Journal of Occupational Medicine;* **29**: No. 7, 601-604(Jul 1987).

A nested case-control study was conducted among workers employed in two nuclear facilities to investigate the possible association of primary CNS cancers with occupational exposure to radiation from external and internal sources. External radiation monitoring data from film badges were available for 27 cases and 90 matched controls. The radiation dose to the lung from internally deposited uranium was estimated for 47 cases and 120 matched controls from area and personnel monitoring data and was used in analyses in lieu of the brain dose. No association was observed between deaths from CNS cancers and exposure to ionizing radiation from external or internal sources. However, due to the small number of monitored subjects and low doses, a modest association could not be ruled out.

48516 **Inactivation by monochromatic near-UV radiation of an Escherichia coli hemA8 mutant grown with and without delta-aminolevulinic acid: the role of DNA vs membrane damage.** Peak, M.J.; Johnson, J.S.; Peak, J.G.; Tuveson, R.W. (Argonne National Lab., IL, USA; Illinois Univ., Urbana, US. Dept. of Genetics and Development). *Photochemistry and Photobiology;* **45**: No. 4, 473-478(Apr 1987).

Escherichia coli strain RT8 hemA8 [blocked in biosynthesis of delta-aminolevulinic acid (delta-ALA), and unable to manufacture porphyrins unless exogenously supplied with delta-ALA] is inactivated more efficiently by monochromatic 334- and 405-nm radiations if the cells are grown with delta-ALA supplementation. The fluence enhancement factor for delta-ALA sensitization is larger for light at 405 nm than at 334 nm. Both irradiation conditions (plus or minus delta-ALA) showed prominent oxygen enhancement ratios, which were also larger at405 nm than at 334 nm. At 334 nm, delta-ALA supplementation did not affect the accumulation of DNA breaks, while at 405 nm, the induction of DNA breaks doubled for cells supplemented with delta-ALA. Rubidium leakage caused by 405-nm radiation occurred at a smaller fluence in cells supplemented with higher concentrations of delta-ALA than in cells supplemented with a lower concentration. The results suggest that (1) porphyrin derivatives may have a role in cell killing by near-UV radiations, and (2) damage to cytomembranes may be a critical lesion produced by these events, whereas DNA breakage may not.

48517 **Sensitivities to monochromatic 254-nm and 365-nm radiation of closely related strains of Saccharomyces cerevisiae with differing repair capabilities.** Roth, R.M.; Game, J.C.; Peak, M.J. (Illinois Inst. of Tech., Chicago, USA. Dept. of Biology; California Univ., Berkeley, USA. Donner Lab.; Argonne National Lab., IL, USA). *Photochemistry and Photobiology;* **45**: No. 4, 479-483(Apr 1987).

Sensitivity to monochromatic 254- and 365-nm radiation was compared in closely related yeast strains with defects in one or more of the excision-repair (rad1), error-prone repair (rad18), or recombinational-repair (rad51) pathways. At 254 nm, mutants defective in a single repair pathway exhibited slight to moderate UV sensitivity;,those defective in two separate pathways were somewhat more UV sensitive, while triple mutants defective in all three pathways exhibited extreme UV sensitivity with a lethal event corresponding to 0.05 J m^{-2}. Repair defects also rendered mutants sensitive to 365-nm radiation: strains with single defects exhibited slight sensitivity, mutants with two defective pathways were more sensitive, and triple mutants exhibited maximal sensitivity with a lethal event corresponding to 2.4 x 10^4 J m^{-2}. Evidence for dimer involvement in the yeast mutant was obtained by demonstrating that lethality at both 254 and 365 nm was photoreactivated by light at 405 nm.

48518 **Effects of separate and combined treatments with gamma radiation and diethylnitrosamine in neonatal rats on the induction of altered hepatocyte foci and hepatic tumors.** Peraino, C.; Grdina, D.J.; Staffeldt, E.F.; Russell, J.J.; Prapuolenis, A.; Carnes, B.A. (Argonne National Lab., IL). *Carcinogenesis;* **8**: No. 4, 599-600(Apr 1987).

To characterize the effects of combined treatments with gamma radiation and diethylnitrosamine (DEN) on the induction of histochemically detectable altered hepatocyte foci and hepatic tumors, we assessed the yields of these lesions in the livers of 150-day-old rats that had been treated neonatally with a single dose of gamma radiation and i.p.-injected DEN, either separately or in combination. The focus population was examined for two histochemical markers (elevated gamma glutamyl transpeptidase [GGT(+)] and iron exclusion [FE(-)], giving rise to three detectable focus phenotypes, i.e. GGT(+) foci, FE(-) foci, and GGT(+), FE(-) foci. These results suggest that (i) phenotypically distinguishable lesions, including foci with different histochemical marker patterns

and tumors, originate from specific types of damage at different genetic loci and are developmentally independent; and (ii) the expression of the GGT(+) market per se in altered hepatocyte foci is not a reliable index of incipient hepatic neoplasia.

48519 **Mixtures of toxic agents and attributable risk calculations.** Seiler, F.A.; Scott, B.R. (Inhalation Toxicology Research Institute, Albuquerque, NM). *Risk Analysis;* 7: No. 1, 81-90(Mar 1987). Contract AC04-76EV01013.

Calculations of attributable risks have attracted increasing interest recently. However, these efforts have been limited to mostly one agent, radiation, and no interactions with effects of other toxic agents have been taken into account. This paper outlines a generic approach to the calculation of attributable risks for an exposure to several toxic agents and interaction effects associated with them. In this calculation, the partition of interaction terms between the agents responsible is of particular importance. At present, there are no rules on how to assign equitable shares, so one methodology will be proposed and others discussed briefly. For one example of an assignment, the standard errors of the attributable risks are determined in terms of the uncertainties of the input parameters, thus setting the stage for a comparison of the different shares of responsibility.

48520 **Flow cytometric measurement of the metabolism of benzo [a] pyrene by mouse liver cells in culture.** Bartholomew, J.C.; Wade, C.G.; Dougherty, K. (Lab. of Chemical Biodynamics, Lawrence Berkeley Lab., Univ. of California, Berkeley, CA 94720). pp 311-323 of Biological dosimetry: Cytometric approaches to mammalian systems. Eisert, W.G.; Mendelson, M.L. New York, NY; Springer-Verlag New York Inc. (1984).

The metabolism of benzo[a]pyrene in individual cells was monitored by flow cytometry. The measurements are based on the alterations that occur in the fluorescence emission spectrum of benzo[a]pyrene when it is converted to various metabolities. Using present instrumentation the technique could easily detect 1 x 10/sup 6/ molecules per cells of benzo [a]pyrene and 1 x 10/sup 7/ molecules per cell of the diol epoxide. The analysis of C3H IOT 1/2 mouse fibroblasts growing in culture indicated that there was heterogeneity in the conversion of the parent compound into diol epoxide derivative suggesting that some variation in sensitivity to transformation by benzo[a]pyrene may be due to differences in cellular metabolism.

48521 **Biological dosimetry: Cytometric approaches to mammalian systems.** Eisert, W.G.; Mendelson, M.L. New York, NY; Springer-Verlag New York Inc. (1984). 346p. Springer-Verlag New York Inc., 175 Fifth Ave., New York, NY 10010.

Biological dosimetry carries the concept one step further by describing dose in terms of a defined biological response. For mutagens this might take the form of induced mutations, for clastogens of induced chromosome aberrations, for ionizing radiation of changes in circulating blood cells, for a reproductive toxin of altered sperm or decreased fertility. Such dosimetry has two general functions: a backwards-looking function to reconstruct the effective physical or chemical dose actually received by the subject; and a forwards-looking function to discover the biologically meaningful dose and thereby to predict some later or more important effect or to titrate more delicately the ultimate physical or chemical dose that should be given to achieve a certain effect.

5602 Thermal Effects

REFER ALSO TO CITATION(S) 47287

5603 Chemicals Metabolism And Toxicology

REFER ALSO TO CITATION(S) 47016, 47050, 47055, 47065, 47117, 47154, 47191, 48316, 48317, 48320, 48325, 48358, 48364, 48376, 48464, 48518, 48519

48522 **(AD-A—182179/2/XAB) Effect of 2,3,4-trimethylpentane on the ultrastructure of kidneys from normal versus castrated male rats.** Mattie, D.; Chase, M.; Hobson, D. (Air Force Aerospace Medical Research Lab., Wright-Patterson AFB, OH (USA)). 1986. 3p. (AAMRL-TR—87-017). NTIS, PC A02/MF A01.

Pub. in Proceedings of the Annual Meeting of the Electron Microscopy Society of America (44th), 356-357(1986).

Studies in this laboratory have shown that exposure to vapors of hydrocarbon fuels such as JP-5, JP-4 and diesel fuelmarine produce kidney lesions, including protein deposition, proximal tubular cell degeneration and intratubular casts in male rats, but not in female rats. 2,2,4 trimethylpentane (TMP) is a principal component of gasoline. Both 2,2,4 TMP and its more potent isomer, 2,3,4 TMP, in gavage studies produced kidney lesions identical to those seen in acute fuel-inhalation exposures. Only male rats produce a testosterone dependent alpha 2u globulin, a low-molecular-weight plasma protein. Since this protein appears to be involved in the pathogenesis of the kidney lesion, castrated rats were also exposed to 2,3,4 TMP and examined by transmission electron microscopy. The purpose of this study was to examine the early pathogenesis of the kidney lesion in both normal and castrated rats following exposure to 2,3,4 TMP.

48523 **(INIS-mf—10690) Influence of some radioprotective and radiosensitizing compounds on the replicative and repair induced DNA synthesis of rats spleen cells in vitro.** Goette, A. (Muenchen Univ. (Germany, F.R.). Fachbereich Tiermedizin). 30 Jul 1982. 164p. (In German). NTIS (US Sales Only), PC A08/MF A01. File Number DE87752787.

The effect of cysteine, dithiothreitol, N-ethylmaleimide, cytosinearabinoside, ethidiumbromide, bleomycine and diethyldithiocarbamate on the replicative and repair induced DNA synthesis in vitro was tested by using rats spleen cells. Besides the incorporation of a labeled DNA precursor (TdR-/sup 3/H) the sedimentation of DNA in sucrose gradients was inquired. With respect to the DNA synthesis an uniform mechanism of action for the radioprotective substances can't be seen. Thymocytes and spleen cells seem to possess different systems of repair; this may be an explanation for their different sensibility against ionizing radiation.

48524 (KFK-PEF—12-Vol.2, pp 769-777) **Dose-response-relation between croup syndrome/obstructive bronchitis and ambient air pollution in Baden-Wuerttemberg.** Wichmann, H.E.; Klug, S. (Duesseldorf Univ., Germany, F.R. Medizinisches Inst. fuer Umwelthygiene). Apr 1987. (In German). NTIS (US Sales Only), PC A19/MF A01. File Number DE87753279. (CONF-8703151—Vol.2).

From 3. PEF status colloquium of Kernforschungszentrum Karlsruhe G.m.b.H.; Karlsruhe, F.R. Germany (10 Mar 1987).

From 1986 to 1988 the potential influence of ambient air pollution on croup syndrome and obstructive bronchitis will be investigated in Stuttgart, Tuebingen/Reutlingen/Rottenburg and Freudenstadt. About 200 physicians (most of them pediatricians) and 3 children's hospitals participate and report the daily number of cases. For a subgroup of these children virologic investigations are performed. In addition, the parents of about 9300 school beginners will be interviewed and their answers will be validated and completed by the family doctors. The provisional results from 1986 are discussed.

48525 **(NP—7770324) Effects of cadmium on the metabolism of vegetable plants - a study investigating into the effects observed in greenhouses and vegetable fields in the surroundings of Hamburg.** Wichmann, G. (Hamburg Univ. (Germany, F.R.). Fachbereich 13 - Chemie). 17 Sep 1982. 121p. (In German). NTIS (US Sales Only), PC A06. File Number DE87770324.

The study investigates into the effects of cadmium on the metabolism of bush beans and carrots. Higher concentrations proved to hamper their growth and result in symptoms such as chlorosis and leaf spots. Lower concentrations did already bring about changes in the protein and carbohydrate household. The tests performed proved to verify the connection between the cadmium content of soils, pH value of soils and the cadmium absorption of plants.

48526 **(NP—7770326) Uranyl nitrate induced renal failure in awake rats: The influence of theophyllin and ribose on the survival rate.** Abrar, B. (Technische Hochschule Aachen (Germany, F.R.). Medizinische Fakultaet). 7 Feb 1983. 29p. (In German). NTIS (US Sales Only), PC A03. File Number DE87770326.

This work showed the effect of uranly nitrate on the survival rate of awake rats. Four groups were used. The average survival rate of the non-treated control animals was 15%. They died of the symptoms of uremia. The administration of theophyllin (24 mg/kg i.p. T/D) improved the survival rate from 15 to 83%. The administration of ribose (300 mg/kg i.v. T/D) also had a positive effect on the survival rate of poisoned rats. The combined treatment with ribose and theophyllin showed that inside of 10 days only one out of 14 rats died. The surviving animals from this group appeared normal 19 days after the initial poisoning. An antagonism to the endogenous adenosine is being discussed as a possible manner of function for theophyllin. The results here allow a trial treatment of acute renal failure in humans with theophyllin appear meaningful.

48527 **(NP—7770327) Epidemiological study of mercury elimination in the urine of children living in an industrial area (middle of the Ruhr area) in comparison to those living in a non-industrial area (Westphalia).** Meilwes, T. (Technische Hochschule Aachen (Germany, F.R.). Medizinische Fakultaet). 7 Nov 1984. 50p. (In German). NTIS (US Sales Only), PC A03. File Number DE87770327.

In conclusion, one can determine that only a very small amount of mercury is present in all the cities. In the cities of Ahlen and Duelmen there was a higher elimination and thus a higher environmental concentration of mercury as in the Ruhr area, there are no sex-dependent differences, there is a certain dependency between mercury values and length of time spent living in affected areas, the materials used for heating in the households did not play a role in the mercury levels.

48528 **(PB—87-205639/XAB) Development and application of algorithms for generating estimates of toxicity for the NOHS (National Occupational Hazard Survey) data base. Technical report.** Venable, H.L. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA). Div. of Surveillance, Hazard Evaluation and Field Studies). Jul 1986. 107p. (DHHS/PUB/NIOSH—87-101). NTIS, PC PC E07/MF A01.

Errata sheet inserted.

Computer-based algorithms were developed and applied to the chemical compounds listed in the NIOSH National Occupational Hazard Survey data base to generate estimates of toxicity for these compounds for the median oral toxic dose in rats, mutagenicity, carcinogenicity, and teratogenicity potentials. All four algorithms which were developed contained the assumption that a structure/activity relationship existed among groups of compounds that exhibited similar chemical characteristics. The toxic effects noted and reported were used as the basis for assigning a toxic or nontoxic status to the parent compound. These algorithms did not consider site of toxic effect, type of cancer, or the actual cause of death in the case of the median lethal dose (LD50) algorithm. The author concludes that these models can serve as tools for investigating the potential toxicity of compounds, although they cannot be used in place of animal test data.

48529 **(PB—87-205670/XAB) NIOSH (National Institute for Occupational Safety and Health) pocket guide to chemical hazards. Second edition.** (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Feb 1987. 254p. (DHHS/PUB/NIOSH—85-114). NTIS, PC A12/MF A01.

Supersedes PB—87-101838.

Information on chemical hazards was provided in tabular form in the pocket guide for use as a quick reference source relating to general industrial hygiene and medical surveillance practices. The guide was intended for use by workers, employers, and occupational health professionals. Minor technical changes were included in the second printing (February, 1987). Chemical names and synonyms, exposure limits and recommendations, chemical and physical properties, incompatibilities of one substance with another, analytical methods, respiratory and personal protective equipment recommendations, toxicological route that the hazardous material takes in humans (inhalation, skin absorption, ingestion, skin or eye contact), signs and symptoms of exposure, target organs, and procedures for emergency treatment were provided for various substances deemed to be chemical hazards in the workplace. Potentially hazardous substances or conditions evaluated by NIOSH through July of 1986 were tabulated. A section was included on the best use of the pocket guide.

48530 **(PB—87-214854/XAB) Characteristics, deposition, and fate of inhaled particulate matter.** Armentrout, D.; Locke, B. (PEI Associates, Inc., Cincinnati, OH (USA)). Dec 1986. 53p. NTIS, PC A04/MF A01.

Accurate estimates of absorption and fate for particulate matter in the respiratory tract are difficult because of complexities in particle composition and morphology. Several deficiencies in information further complicate the ability to make accurate estimates. Available models for making estimates range from single models based on assumed particle size distribution to more-complex models based on a variety of parameters. Most work in the area of estimating particle fate following inhalation has been done on aerosols of known composition. Additional work is needed to categorize properties of inhalable particles with respect to composition in addition to morphology. Additional research is needed to define the effects of pulmonary disease on particle clearance from the lung. Additional research also is needed to better explain the mechanics of clearance from the pulmonary region of the lung.

48531 **Metabolism of nasally instilled benzo(a)pyrene and dihydrosafrole in dogs and monkeys.** Petridou-Fischer, J.; Whaley, S.; Dahl, A. (Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM). *Federation Proceedings, Federation of American Societies for Experimental Biology;* **46**: No. 6, 2143(1 May 1987). (CONF-870644—). Contract AC04-76EV01013.

From 78. annual meeting of the American Society of Biological Chemists conference; Philadelphia, PA, USA (7 Jun 1987).

Cytochrome P-450 monooxygenases are found in the nasal cavities of a variety of species and could play an important role in the metabolism of inhaled airborne xenobiotics. The object of this study was to examine the metabolism of ^{14}C-benzo(a)pyrene (BaP) and ^{3}H-dihydrosafrole (DHS) deposited at the ethmoid and maxillary turbinate regions in Beagle dogs and Cynomolgus monkeys. While the animals were anesthetized, either compound was instilled at 10 minute intervals for 2 hours through catheters positioned at each region. Cotton swab samples of mucus from the nasopharynx were collected at 30 minute intervals during instillation. Metabolites in mucus were identified using high pressure liquid chromatography. Results showed that both regions in both species were capable of metabolizing BaP and DHS. BaP metabolites identified in the mucus were dihydrodiols, quinones, phenols, and tetrols. DHS metabolites were 2-methoxy-4-propyl-phenol, 2-methoxy-4-(2-propenyl)benzene, and 3,4-methylenedioxy-1-(1-hydroxypropyl)benzene. Radioactivity was found in urine and feces of animals treated with either compound, and was detected in the blood of animals treated with DHS. No differences were noted for the nasal metabolism between the two species. This study indicated that not only the nasal tissues, but also the alimentary tract, may be exposed to metabolites of inhaled xenobiotics carried by the mucus.

48532 **Effects of CO_2 enrichment and nutrition on growth, photosynthesis, and nutrient concentration of Alaskan tundra plant species.** Oberbauer, S.F.; Sionit, N.; Hastings, S.J.; Oechel, W.C. (San Diego State Univ., CA). *Canadian Journal of Botany;* **64**: No. 12, 2993-2998(Dec 1986). Contract AC03-82ER60079.

Three Alaskan tundra species, Carex bigelowii Torr. Betula nana L., and Ledum palustre L., were grown in controlled-environment chambers at two nutrition levels with two concentrations of atmospheric CO_2 to assess the interactive effects of these factors on growth, photosynthesis, and tissue nutrient content. Carbon dioxide concentrations were maintained at 350 and 675 $\mu L\ L^{-1}$ under photosynthetic photon flux densities of 450 $\mu mol\ m^{-2}\ s^{-1}$ and temperatures of 20:15°C (light:dark). Nutrient treatments were obtained by watering daily with 1/60- or 1/8-strength Hoagland's solution. Leaf, root, and total biomass were strongly enhanced by nutrient enrichment regardless of the CO_2 concentration. In contrast, enriched atmospheric CO_2 did not significantly affect plant biomass and there was no interaction between nutrition and CO_2 concentration during growth. Leaf photosynthesis was increased by better nutrition in two species but was unchanged by CO_2 enrichment during growth in all three species. The effects of nutrient addition and CO_2 enrichment on tissue nutrient concentrations were complex and differed among the three species. The data suggest that CO_2 enrichment with or without nutrient limitation has little effect on the biomass production of these three tundra species.

5604 Other Environmental Pollutant Effects

48533 **(AD-A—182397/0/XAB) Frequency-dependent energy absorption in the body and tail of the rodent carcass exposed to radiofrequency radiation. Final report, 31 June-31 December 1985.** Bixby, R.R.; Padilla, J.M. (School of Aerospace Medicine, Brooks AFB, TX (USA)). Apr 1987. 15p. (USAFSAM-TR—87-1). NTIS, PC A02/MF A01.

The proportion of energy absorbed by the tail of a rat carcass was determined. Male (288 g - 457 g) and female (195 g - 249 g) Sprague-Dawley rat carcasses were exposed to far-field, continuous-wave radiofrequency radiation (RFR). The carcasses were split into two mixed groups: one group was exposed to 700-MHz RFR; and the other, to 350-MHz RFR. Immediately after each exposure, the tail was severed, and the specific absorption rates (SAR) of the tail and body were determined by Dewar flask calorimetry. For example, a 195 g female exposed to 700 MHz yielded SARs of 1.26 and 3.64 mW/g (normalized to 1 nW/cm2 incident power density) for its body and tail, respectively; the tail contributed 6.7% to the total energy absorption. For a 205 g female exposed to 350 MHz, however, the tail contributed 19.0% to the whole-body absorption. Normalized SARs of 0.40 and 4.03 nW/g per mW/cm2 were obtained for the body and tail, respectively.

48534 **(SIS—1987:3) Irradiation from video display terminals.** Backe, S.; Hannevik, M. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1987. 26p. (In Norwegian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87752523.

Video display terminals (VDT's) are in common use by computer operators. In the last years this group of workers has expressed growing concern about their work environment and possible hazardous effects in connection with radiation emission from VDT's. Radiation types and levels of emission and possible biological effects have been the subject of research activity in Norway and in other countries. This report summarizes the various radiation types and their levels of emission from VDT's. An overview of recent epidemiological studies and animal experiments, and the conclusions given by the research groups are also presented. The conclusions drawn in this report based on the current knowledge are: Radiation, other than low frequency pulsed magnetic fields, have low and negligible emission levels and will not represent any health hazard to VDT-operator or to the foetus of pregnant operators. The biological effects of low frequency pulsed mangetic fields have been the subject of epidemiological studies and animal experiments. Epidemiological studies carried out in Canada, Finland, Sweden and Norway gave no support for any correlation between pregnancy complications and operation of VDT's. From animal experiments it has so far been impossible to assert an effect on pregnancy outcome from low frequency pulsed magnetic fields.

58 GEOSCIENCES

REFER ALSO TO CITATION(S) 48368

5801 Geology And Hydrology

REFER ALSO TO CITATION(S) 47236, 47552, 48420

48535 **(LA—10943-MS) Deposits of the Creede Caldera, Colorado.** Heiken, G.; Krier, D. (Los Alamos National Lab., NM (USA)). Jun 1987. Contract W-7405-ENG-36. 70p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014709.

The Creede Formation was deposited within closed basin(s) of the Creede caldera (26.4 Ma) moat after structural resurgence of Snowshoe Mountain. Sedimentary facies consist of (1) fanglomerates on the caldera walls and resurgent dome, including a large paleoalluvial fan within the Creede Mining District; (2) interbedded sandstones, siltstones, and travertine beds of the lacustrine deposits; (3) massive travertine bodies; and (4) bedded tuff horizons. Provenance of the clastic rocks is the caldera walls, resurgent dome, and intracaldera lavas. Intracaldera volcanism and travertine deposition were continuous throughout deposition of the Creede Formation. Clastic rocks are all tuffaceous, and interbedded tuffs are common. Most of the Creede Formation was deposited after structural resurgence. Many travertine fissure ridges are located at the hinge line of the resurgent dome, suggesting that low-temperature hydrothermal activity began after resurgence. We propose that the original thickness of the Creede Formation was not much greater than it is at present and that some of the original depositional surfaces may be preserved. Diagenetic minerals in the tuffaceous clastic rocks and bedded tuffs of the Creede Formation include opal, smectite, clinoptilolite, heulandite(?), analcime, and K-feldspar. Rocks with a vitric ash component occur in some peripheral moat locations. Preliminary interpretation of mineral distribution suggests that diagenetic alteration of the moat sedimentary rocks took place in a closed-basin, saline, alkaline lake(s) environment.

48536 (UCRL—50025-87-1, pp 42-53) **Estimates of fluid permeability from digital image analysis of porous media.** Berryman, J.G. Apr 1987. NTIS, PC A04/MF A01. File Number DE87009361.

In Electronics Engineering Department EE technical review.

Using digital image-processing techniques, electron microscope images of cross sections of three very different porous specimens were analyzed and accurate prediction of their hydraulic resistivity were made. The digital image analysis system is described.

5802 Geophysics

REFER ALSO TO CITATION(S) 47227, 47236, 48310

48537 **(AD-A—182420/0/XAB) Latitudinal motions of the aurora during substorm.** Craven, J.D.; Frank, L.A. (Iowa Univ., Iowa City (USA). Dept. of Physics and Astronomy). 1 May 1987. 10p. NTIS, PC A02/MF A01.

Pub. in Jnl. of Geophysical Research, Vol. 92, No. A5, 4565-4573(1 May 1987) Supersedes AD-A178 651.

Sequences of auroral images obtained with Dynamics Explorer 1 are used to investigate latitudinal motions of the aurora in substorms. Average speeds of poleward motion are about 230 m/s near local midnight for two isolated, small substorms and about 1000 m/s during an intensification within a previously active auroral oval. The speed of poleward expansion measured at about 6-min temporal resolution can differ greatly from the average speed because of the episodic development of substorms. This poleward motion may be influenced by the sign of the z component of the interplanetary magnetic field. Recovery of the high-latitude boundary of the aurora to presubstorm latitudes is first observed in the

postmidnight sector. In the premidnight sector the discrete aurora can become stationary for a period of time or even continue further poleward before a retreat to lower latitudes begins. For these substorms, the expansion and recovery phases are not separated by an about 5-deg poleward leap of the aurora. During the recovery phase, a prominent decrease in luminosities is first observed at intermediate latitudes within the auroral distribution. The region is bounded at higher latitudes by the discrete aurora and at lower latitudes by bright diffuse aurora. Given that magnetic field lines threading these auroral distributions map to the plasma sheet boundary layer and to the central plasma sheet, respectively, magnetic field lines at the intermediate auroral latitudes then map to the plasma sheet at distances of some what 22 R/sub E/.

48538 **(CEA-CONF—8641) Comparative analysis of accelerogram processing methods.** Goula, X.; Mohammadioun, B.; Hamaide, D. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Jan 1986. 12p. (In French). (CEA-DAS—211; CONF-860189—2). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752562.

From 1. national colloquium on paraseismic engineering; Saint-Remy-les-Chevreuse, France (29 Jan 1986).

The work described is a short development of an on-going research project, concerning high-quality processing of strong-motion recordings of earthquakes. Several processing procedures have been tested, applied to synthetic signals simulating ground-motion designed for this purpose. The methods of correction operating in the time domain are seen to be strongly dependent upon the sampling rate. Two methods of low-frequency filtering followed by an integration of accelerations yielded satisfactory results.

48539 **(CEA-CONF—8642) Strong movement data currently available at IPSN/DAS.** Hamaide, D.; Mohammadioun, B.; Mohammadioun, G. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). Jan 1986. 16p. (In French). (CONF-860189—3). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752563.

From 1. national colloquium on paraseismic engineering; Saint-Remy-les-Chevreuse, France (29 Jan 1986).

The collection of recordings and other data on strong seismic motion compiled by the Departement d'Analyse de Surete de l'Institut de Protection et de Surete Nucleaire (Commissariat a l'Energie Atomique) to form a data base known as "sismotheque" are presented. Following an introduction wherein the necessity of creating such a repertory for evaluating seismic hazard on the sites of nuclear facilities is explained, a description is given of the means engaged, i.e. motion recorded by the DAS's own laboratory or data procured from other research units in France or abroad. The quantity and quality of the data now available are summarized, as well as the techniques designed to gain access to desired information, illustrated by concrete examples. The paper concludes with recommendations for future developments.

48540 **(CEA-DAS—153) General seismology and seismogenesis. Near field seismic movement studies.** Mohammadioun, B. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete). 1985. 10p. (In French). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752587.

Basic principles from "paraseismic engineering" book are resumed here. Plate tectonics, aftershocks, seismic instrumentation, strong movements (kinematic and dynamic models) are considered.

48541 **(INIS-SU—412, pp 49-52) On the muon method in neutrino geophysics.** Saleev, V.A.; Tsarev, V.A.; Chechin, V.A. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780177.

Kratkie Soobshcheniya po Fizike.; (no.7).

In Experimental and theoretical physics. Collection.

The method of improvement of the muon method applied in neutrino geophysics in prospecting for ore deposits is considered. The method consists in measuring the spectrum instead of the integral muon flux which permits to increase the signal-to-noise ratio, i.e. improves the method sensitivity and provides information on the depth of occurence and thickness of ore layer (power). 2 refs.; 3 figs.

48542 **(JINR—18-86-452) Emanation investigations in the Ashkhabad seismic zone.** Ashirov, T.A.; Ishankuliev, D.; Dzholos, L.V.; Merkina, K.I.; Tret'yakova, S.P. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703314.

An improved technique for detecting subsoil radon in the Ashkhabad seismoactive zone in order to predict earthquakes in this region is described. Radon α-particles were recorded with a nitrocellulose detector. Chemical treatment was carried out in a 10% sodium hydroxide solution at 60 deg C temperature, and detector scanning was performed using an optical microscope and a spark counter. The optimal parameters of stationary device for the irradiation of detectors in 70 cm deep pits have been determined experimentally. The points of observation of temporal variations of the radon have been chosen with the aid of emanation survey. Constant radon measurements were carried out at three observation points during the period from 1982 to 1983 at intervals of 5-7 days. The dependence of track density on calendar time and on atmospheric conditions has been found to be regular. A broken regularity may be due to the $K \geqq 10$ energy class seismic event which took place in this region at a distance of 100-130 km from the observation point. 14 references, 11 figures.

48543 **Effect of the El Chichon volcanic cloud on the surface radiative regime in central Alaska.** Wendler, G.; Kodama, Y. (Univ. of Alaska, Fairbanks). *Journal of Climate and Applied Meteorology;* **25**: 1687-1694(Nov 1986).

Five years of detailed radiation measurements were taken at Fairbands, Alaska. These data showed that the El Chichon volcanic cloud had a major impact on the surface radiative regime, the maximum of which was observed in winter 1982/83, about 9 months after the eruption. The direct beam of the solar radiation was reduced by as much as 38% (3-month mean value), the ratio of diffuse over global radiation was increased by 91%, and the global radiation was reduced by about 5%. These values show that the volcanic cloud was a strong forward scatterer, while relatively little energy was absorbed or reflected back to space. Further, the aerosol optical depth and Linke's turbidity factor were calculated, and both displayed substantial increases. Effects of the stratospheric dust cloud were seen all through 1983 and the spring of 1984. In summer 1984, however, the radiative values were back to normal. The authors were compared to other observations at lower latitudes and, in general, a good agreement was found.

5803 Mineralogy, Petrology, And Rock Mechanics

REFER ALSO TO CITATION(S) 47236

5804 Geochemistry

48544 **(ORNL/TM—10488) Geochemistry of shale groundwaters: Survey of available data and postulated mineralogic controls on composition.** Von Damm, K.L. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 362p. NTIS, PC A16/MF A01; 1; GPO Dep. File Number DE88000001.

A literature search and the US Geological Survey WATSTORE data base were used to create a data base of groundwater compositions from shale formations. Data on groundwaters from depths of 61 to 3627 m, from a total of more than 600 stations, were recovered. The waters show a wide range in composition, with the majority being Na-Cl-HCO_3 type waters and Na-HCO_3-Cl being next in abundance. In some waters, particularly those from the Green River and various Gulf Coast formations Ca > Na. None of the dissolved species show a simple relationship to depth, even within a single formation. The constancy of the Na:Cl ratio at 1:1 suggests that halite dissolution may be the ultimate source of these two ions. Small excesses of sodium over chloride in the smectite-rich shales suggest that a calcium for sodium ion exchange may be occurring on the clays. Similarly, the constancy of the Ca:Mg

ratio in most of the samples at from 3:1 to 1:1 suggests that a carbonate may be the ultimate source of these two elements. Equilibrium model calculations suggest that the waters in all cases are undersaturated with halite, and in most cases are undersaturated with calcite and dolomite and saturated or supersaturated with one or more pure SiO_2 phases. The waters are undersaturated with respect to most other mineral phases. In most cases the saturation state of the waters could not be examined with respect to aluminosilicates due to the paucity of available aluminum data. Limited data were also available regarding the redox state of the groundwaters.

5805 Oceanography

48545 (CONF-840572—Summ.) International symposium on observation of the continental crust through drilling: Summary. (Columbia Univ., New York (USA)). 1984. Contract FG05-83ER30056. 12p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87011191.

From International symposium on observation of the continental crust through drilling; Tarrytown, NY, USA (20 May 1984).

The use of the drill to probe the earth's crust, driven by primarily economic incentives, has come a long way since the first oil well at Titusville, Pennsylvania, began producing from a depth of 69 feet in 1859. Wells have now been drilled to depths of over 12 km (in the Kola Peninsula of the USSR), in rocks where the pressure of pore fluid equals the weight of the entire overburden, in rocks at temperatures exceeding 400°C, even in molten basalt in Hawaiian pit craters flooded by recent lava flows. To compensate for the hostility of such environmental extremes, drilling for resources has become one of the most robust of modern technologies. Symposium papers are summarized.

64 PHYSICS I

48546 (INIS-SU—410) Experimental and theoretical physics. Collection. (AN SSSR, Moscow. Fizicheskij Inst.). 1986. 49p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87780176.

Kratkie Soobeshcheniya po Fizike.; (no.9).

Individual papers in this collection are abstracted separately. (LEW)

48547 (INIS-SU—418) Plasma physics. Collection. (AN SSSR, Moscow. Fizicheskij Inst.). 1986. 69p. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

Individual papers in this collection are abstracted separately. (LEW)

6401 Astrophysics And Cosmology

REFER ALSO TO CITATION(S) 48003, 48262, 48285, 48695, 48696, 48698, 48834, 48910

48548 (AD-A—181881/4/XAB) Total solar eclipse of 17-18 March 1988. Fiala, A.D.; Bangert, J.A.; Harris, W.T. (Naval Observatory, Washington, DC (USA)). 17 Mar 1987. 43p. (NOBS-CIRC—172). NTIS, PC A03/MF A01.

It is a continuing policy of the Nautical Almanac Office to prepare issues of the series of Naval Observatory Circulars containing detailed information for observing most total solar eclipses and some annular solar eclipses. This is a service to the international scientific community, based on agreements with Commissions and Working Groups of the International Astronomical Union. A total eclipse of the Sun will occur on Thursday, 17 March and Friday, 18 March 1988. It will be preceded by an associated short partial eclipse of the Moon on 3 March. The duration of totality of the solar eclipse will approach 4 minutes at maximum, the longest since 11 June 1983. Not much of the path is over land. First landfall will occur just after sunrise at the west coast of Sumatra, at Oh 28m U.T. The track will cross Sumatra in three minutes, with the umbral shadow growing so as to increase both the width of the path and the duration of totality. Palembang lies near the central line, and is probably one of the most accessible such places. Bangka Island, just off the east coast of Sumatra, is relatively flat and a mining area. The path will reach Borneo at Oh 36m U.T. with the umbral shadow continuing to expand. It will take approximately 13 minutes to cross the island, and the track will lie completely within Indonesian territory on Borneo. The other major land mass in the path of totality is the southern tip of Mindanao.

48549 (AD-A—182265/9/XAB) HELIOS photometer measurement of in-situ density enhancements. Jackson, B.V. (California Univ., San Diego, La Jolla (USA). Center for Astrophysics and Space Sciences). 1986. 5p. NTIS, PC A02/MF A01.

Pub. in Advances in Space Research, Vol. 6, No. 6, 307-310(1986).

The HELIOS spacecraft zodiacal light photometers have been used to image coronal mass ejections and coronal streamers in the interplanetary medium. The HELIOS photometers have the ability to image such features beyond 90 angular distance from the Sun. This provides a unique opportunity to measure brightness enhancements which are also observed as density increases in situ by the HELIOS spacecraft plasma probes. Here, the authors compares the brightness enhancements and in situ density increases following shocks defined by the plasma and magnetic-field data. Five well-observed shocks from 1976 and 1979 illustrate these comparisons. Each event can be followed in photometer data as it sweeps past the HELIOS spacecraft. To first order, the enhancements of brightness following shocks indicate structure that extends over many tenths of an astronomical unit and colors consistent with Thomson scattering of sunlight by electrons.

48550 (AD-A—182266/7/XAB) Metric type-III burst asymmetry relative to simple bipolar active regions. Jackson, B.V. (California Univ., San Diego (USA)). 1986. 11p. NTIS, PC A02/MF A01.

Pub. in Solar Physics, Vol. 105, 123-132(1986).

Metric type-III solar radio burst positions are compared spatially and temporally to underlying active-region geometry. The positions of these radio bursts have an asymmetric location distribution relative to simple bipolar regions. The type-III bursts show a tendency to occur nearer the leading active region - an association shown before from type-III burst and magnetic-field-polarity measurements. The type-III burst also generally occur to the left of the outward- to inward-directed magnetic field. The asymmetry relative to the outward directed magnetic field has a sense that is consistent with a mechanism of type-III burst production that involves a pre-existing coronal current system situated between expanding closed and open magnetic field lines.

48551 (BNL—39991) Stratospheric particles: Synchrotron x-ray fluorescence determination of trace element contents. Sutton, S.R.; Flynn, G.J. (Brookhaven National Lab., Upton, NY (USA); State Univ. of New York, Plattsburg (USA). Dept. of Physics). 1987. Contract AC02-76CH00016. 27p. (CONF-870396—5). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87012482.

From Lunar and planetary science conference; Houston, TX, USA (16 Mar 1987).

The first trace element analyses on stratospheric particles using synchrotron x-ray fluorescence (SXRF) are reported. Cr, Mn, Fe, Ni, Cu, Zn, Ga, Ge, Se and Br were detected. Concentrations for chondritic particle U2022G1 are within a factor of 1.7 of CI for all elements detected with the exception of Br which is 37 times CI. Chondritic particle W7029*A27 is also near CI for Cr, Mn, Fe, Ni, Cu, Zn and Ge but enriched in Ga, Se, and Br by factors of 5.8, 3.5 and 8.4, respectively. The third particle of the cosmic dust class also showed high Br enriched relative to CI by a factor of 28. Br was also detected at a high level in an aluminum-rich particle classified as probable artificial terrestrial contamination but exhibiting a chondritic Fe/Ni ratio. Br was not detected in a fifth particle also classified terrestrial and exhibiting a crustal Fe/Ni ratio. If the high Br has a pre-terrestrial origin, the ubiquity of the effect suggests that a large fraction of the chondritic interplanetary dust particles derive from a parent body (bodies) not sampled in the meteorite collection. 26 refs., 3 figs., 3 tabs.

48552 **(BNL—40105) Neutrinos in supernovae.** Cooperstein, J. (Brookhaven National Lab., Upton, NY (USA)). Oct 1986. Contract AC02-76CH00016. 47p. (CONF-8610332—1). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014295.

From Hans Bethe's birthday conference on supernovae; Ithaca, NY, USA (19 Oct 1986).

The role of neutrinos in Type II supernovae is discussed. An overall view of the neutrino luminosity as expected theoretically is presented. The different weak interactions involved are assessed from the standpoint of how they exchange energy, momentum, and lepton number. Particular attention is paid to entropy generation and the path to thermal and chemical equilibration, and to the phenomenon of trapping. Various methods used to calculate the neutrino flows are considered. These include trapping and leakage schemes, distribution-averaged transfer, and multi-energy group methods. The information obtained from the neutrinos caught from Supernova 1987a is briefly evaluated. 55 refs., 7 figs.

48553 **(CEA-CONF—8829) High energy galaxy.** Cesarsky, C.J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Inst. de Recherche Fondamentale (IRF)). Aug 1986. 22p. (CONF-8608185—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752567.

From NAT ASI meeting: the galaxy; Cambridge, UK (4 Aug 1986).

The galaxy is host to a wide variety of high energy events. I review here recent results on large scale galactic phenomena: cosmic-ray origin and confinement, the connexion to ultra high energy gamma-ray emission from X-ray binaries, gamma ray and synchrotron emission in interstellar space, galactic soft and hard X-ray emission.

48554 (INIS-SU—410, pp 3-5) **Comparison of three methods of restoration of cosmic radio source profiles.** Malov, I.F.; Frolov, V.A. 1986. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87780176.

Kratkie Soobshcheniya po Fizike.; (no.9).

In Experimental and theoretical physics. Collection.

Effectiveness of three methods for restoration of radio brightness distribution over the source: main solution, fitting and minimal - phase method (MPM) - was compared on the basis of data on module and phase of luminosity function (LF) of 15 cosmic radiosources. It is concluded that MPM can soccessfully compete with other known methods. Its obvious advantages in comparison with the fitting method consist in that it gives unambigous and direct restoration and a main advantage as compared with the main solution is the feasibility of restoration in the absence of data on LF phase which reduces restoration errors. 6 refs.; 3 figs.; 1 tab.

48555 (INIS-SU—412, pp 27-30) **Photon dispersion in a magnetic field with account for positronium production.** Usov, V.V.; Shabad, A.E. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780177.

Kratkie Soobshcheniya po Fizike.; (no.7).

In Experimental and theoretical physics. Collection.

Dispersion curves of mixed states of photon and positronium atom in a strong magnetic field are described. Some of astrophysical consequences of formation of such states in pulsar magnetospheres are enumerated. The production of bound, not of free electron-positron pairs by gamma-quanta at B >or approx, 0.1 B/sub cr/ magnetic field values decreases electric field screening by plasma near pulsars. As a result the expected pulsar luminosity increases as compared with the generally accepted. Most of the bound pairs before outlet from pulsar magnetospheres has time for annihilation by 2 or greater number of photons which again produce the pairs. This results in increase of photon number and therefore of concentration of electron-positron plasma flowing out of pulsars. 11 refs.; 1 fig.

48556 (INIS-SU—417, pp 6-8) **Phase density of neutrons emitted by an atmosphereless planet.** Goryachev, B.I.; Isakov, A.I.; Lin'kova, N.V. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

An approach to calculation of small planet neutron emission characteristics is developed. Using artificial satellites and space probes information on the planet surface may be obtained by analyzing neutron emission being the result of cosmic rays effect. Available calculation methods permit to calculate angular distribution and neutron flux F/sub 0/ from planet surface as a function of its surface layer chemical composition. Neutron flux measured by a sattelite and F/sub 0/ flux may be connected by a function describing neuton phase density near the planet. 1 fig.

48557 **(ITEF—157-1986) Approximation for annihilation neutrino radiation power.** Blinnikov, S.I.; Rudzskij, M.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703294.

Approximate expressions for annihillation neutrino emissivity of equilibrium matter which are more efficient and more exact in the high temperature region than the well-known formulae in workes of Munakata, H.(and others) and Beaudet G.(and others) are presented. 15 refs.; 2 tabs.

48558 **(N—87-24247) Essays in Space Science.** Ramaty, R.; Cline, T.L.; Ormes, J.F. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Jun 1987. 424p. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—). NTIS, PC A18/MF A01.

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The papers presented cover a broad segment of space research and are an acknowledgement of the personal involvement of Frank McDonald in many of these efforts. The totality of the papers were chosen so as to sample the scientific areas influenced by him in a significant manner. Three broad areas are covered: particles and fields of the solar system; cosmic ray astrophysics; and gamma ray, x ray, and infrared astronomics.

48559 (N—87-24247, pp vp) **Magnetospheres of the outer planets.** Vanallen, J.A. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The five qualitatively different types of magnetism that a planet body can exhibit are outlined. Potential sources of energetic particles in a planetary magnetosphere are discussed. The magnetosphere of Uranus and Neptune are then described using Pioneer 10 data.

48560 (N—87-24247, pp vp) **Particle acceleration in solar flares.** Ramaty, R.; Forman, M.A. (State Univ. of New York, Stony Brook). Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The most direct signatures of particle acceleration in flares are energetic particles detected in interplanetary space and in the Earth atmosphere, and gamma rays, neutrons, hard x rays, and radio emissions produced by the energetic particles in the solar atmosphere. The stochastic and shock acceleration theories in flares are reviewed and the implications of observations on particle energy spectra, particle confinement and escape, multiple acceleration phases, particle anistropies, and solar atmospheric abundances are discussed.

48561 (N—87-24247, pp vp) **Energy source of the interplanetary medium and the heliosphere.** Parker, E.N. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The activity of the interplanetary medium arises from occasional transient outbursts of the active corona and, for the most part, from the interaction of fast and slow streams in the solar

wind. The basic driver is the heat input to the corona, both transient and steady. The fast streams issue from coronal holes where the heat input may be Alfven waves with root mean squared (rms) fluid velocities of nearly 100 km/sec or may be wholly or in part the waves refracted into the hole from neighboring active regions. If the latter, then the character of the wind from the coronal hole depends upon the proximity and vigor of active regions, with significant differences between the polar and low altitude solar wind. In any case, there is no observational support for any of these ideas, so that the primary cause of the wind from the Sun, as well as any other similar star is not without mystery. It is to be hoped that ground-based observations together with the input from the Solar Optical Telescope and the International Solar Polar Mission may in time succeed in clearing up some of the basic questions.

48562 (N—87-24247, pp vp) **Particle propagation channels in the solar wind.** Anderson, K.A.; Dougherty, W.M. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The intensities of low energy solar-interplanetary electrons and ions at 1 AU occasionally change in a square wave manner. The changes may be increases or decreases and they typically have durations of from one hour to a few hours. In some cases these channels are bounded by discontinuities in the interplanetary field and the plasma properties differ from the surrounding solar wind. In one case solar flare particles were confined to a channel of width 3 x 10 to the 6th km at Earth. At the Sun this dimension extrapolates to about 12,000 km, a size comparable to small flares.

48563 (N—87-24247, pp vp) **Studies of the interplanetary magnetic field: IMP's to Voyager.** Ness, N.F. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

During the last two decades, spacecraft projects and individual experiments for which Frank McDonald was a leader have contributed very significantly to the current understanding of the structure of interplanetary space and the correlation between solar and interplanetary disturbances. Studies on the IMP, HELIOS, and Pioneer spin-stabilized spacecraft and the larger attitude-stabilized Voyager spacecraft have provided data sets from which the modern view of the heliosphere has evolved. That concept in which the inner solar system is shown to be dominated by individual streams associated with specific source regions on the Sun is illustrated. As these high-speed streams overtake the preexisting solar plasma, they coalesce and modify the characteristics so that at larger heliocentric distances, these disturbances appear as radially propagating concentric shells of compressed magnetic fields and enhanced fluctuations

48564 (N—87-24247, pp vp) **Cosmic rays in the heliosphere.** Webber, W.R. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The different types of cosmic ray particles and their role in the heliosphere are briefly described. The rates of various energetic particles were examined as a function of time and used to derive various differential energy gradients. The Pioneer and Voyager cosmic ray observations throughout the heliosphere are indeed giving a perspective on the three-dimensional character and size of the heliosphere. Most clearly the observations are emphasizing the role that transient variations in the outer heliosphere, and most likely the heliospheric boundary shock, play in the 11 year solar cycle modulation of cosmic rays.

48565 (N—87-24247, pp vp) **Antiprotons in cosmic rays.** Balasubrahmanyan, V.K.; Ormes, J.F.; Streitmatter, R.E. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

Recent experimental observations and results are discussed. It was found that the approximately 50 antiprotons collected in balloon experiments to date have generated considerable theoretical interest. Clearly, confirmatory experiments and measurements over an extended energy range are required before definite conclusions are drawn. Antiproton measurements have a bearing on astrophysical problems ranging from cosmic ray propagation to issues of cosmological import. The next generation of balloon experiments and the Particle Astrophysics Magnet Facility being discussed for operation on NASA's space station should provide data and insights of highest interest.

48566 (N—87-24247, pp vp) **Measurements of ultraheavy cosmic rays with HEAO-3.** Binns, W.R.; Israel, M.H.; Klarmann, J.; Garrard, T.L.; Stone, E.C.; Waddington, C.J. (Minnesota Univ., Minneapolis). Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The HEAO-3 Heavy Nuclei Experiment has measured abundances of elements from Ar-18 to U-92 in the cosmic rays. The results on the ultraheavy elements, those with atomic numbers greater than 30, indicate that the source of the cosmic rays contain a mixture of r-process and s-process material similar to that found in the solar system. This result is at variance with previous indications that the sources are greatly enhanced with freshly synthesized r-process material. Apparent discrepancies between the results and the accepted solar-system abundance have led to a reexamination of data on photospheric abundances of Ge and Pb, resulting in suggested reductions in their values.

48567 (N—87-24247, pp vp) **Origin and propagation of galactic cosmic rays.** Cesarsky, C.J.; Ormes, J.F. (Commissariat a l'Energie Atomique, Gif-sur-Yvette, France). Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The study of systematic trends in elemental abundances is important for unfolding the nuclear and/or atomic effects that should govern the shaping of source abundances and in constraining the parameters of cosmic ray acceleration models. In principle, much can be learned about the large-scale distributions of cosmic rays in the galaxy from all-sky gamma ray surveys such as COS-B and SAS-2. Because of the uncertainties in the matter distribution which come from the inability to measure the abundance of molecular hydrogen, the results are somewhat controversial. The leaky-box model accounts for a surprising amount of the data on heavy nuclei. However, a growing body of data indicates that the simple picture may have to be abandoned in favor of more complex models which contain additional parameters. Future experiments on the Spacelab and space station will hopefully be made of the spectra of individual nuclei at high energy. Antiprotons must be studied in the background free environment above the atmosphere with much higher reliability and presion to obtain spectral information.

48568 (N—87-24247, pp vp) **High energy gamma ray astronomy.** Fichtel, C.E. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

High energy gamma ray astronomy has evolved with the space age. Nonexistent twenty-five years ago, there is now a general sketch of the gamma ray sky which should develop into a detailed picture with the results expected to be forthcoming over the next decade. The galactic plane is the dominant feature of the gamma ray sky, the longitude and latitude distribution being generally correlated with galactic structural features including the spiral arms. Two molecular clouds were already seen. Two of the three strongest gamma ray sources are pulsars. The highly variable x ray source Cygnus X-3 was seen at one time, but not another in the 100 MeV region, and it was also observed at very high energies. Beyond the Milky Way Galaxy, there is seen a diffuse radiation, whose origin remains uncertain, as well as at least one quasar, 3C

273. Looking to the future, the satellite opportunities for high energy gamma ray astronomy in the near term are the GAMMA-I planned to be launched in late 1987 and the Gamma Ray Observatory, scheduled for launch in 1990. The Gamma Ray Observatory will carry a total of four instruments covering the entire energy range from 30,000 eV to 3 x 10 to the 10th eV with over an order of magnitude increase in sensitivity relative to previous satellite instruments.

48569 (N—87-24247, pp vp) **Nucleosynthesis and astrophysical gamma ray spectroscopy.** Jacobson, A.S. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The HEAO-3 gamma ray spectrometer has provided evidence in the quest for the understanding of complex element formation in the universe with the discovery of Al-26 in the interstellar medium. It has demonstrated that the synthesis of intermediate mass nuclei is currently going on in the galaxy. This discovery was confirmed by the Solar Maximum Mission. The flux is peaked near the galactic center and indicates about 3 solar masses of Al-26 in the interstellar medium, with an implied ratio of Al-26/Al-27 = .00001. Several possible distributions were studied but the data gathered thus far do not allow discrimination between them. It is felt that only the spaceflight of a high resolution gamma ray spectrometer with adequate sensitivity will ultimately resolve the issue of the source of this material.

48570 (N—87-24247, pp vp) **Discrete x-ray sources and the x-ray background.** Giacconi, R. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

Since the discovery of a highly uniform x-ray background (XRB) in the 2 to 10 keV range, its nature is not yet fully explained. It appears clear from the results of Einstein medium and deep surveys that at least 50% of the XRB is due to individual extragalactic sources when their contribution is integrated to Z = 3. This includes contribution from Quasi Stellar Objects (QSOs), Active Galactic Nuclei (AGNs), galaxies, and clusters of galaxies. The average spectrum of each of the individual contributing sources is softer than that of the observed XRB. Therefore, the remaining contribution must have a rather hard spectrum of alpha nearly equal to 0.0 to 0.2. It is unlikely that this spectrum can be produced by diffuse processes. Therefore, the remainder of the XRB must be due to individual sources with the appropriate spectrum. This requires either that the spectrum of the already identified sources changes at early epochs or a new class of objects. Advanced x-ray Astrophysics Facility (AXAF) observations will extend survey sensitivity to limiting fluxes of order of 3 x 10 to the minus 16 erg/sq cm/s, some 50 times fainter than any previous survey. There will be sufficient sensitivity and angular resolution to permit identification and study of these objects.

48571 (N—87-24247, pp vp) **Cosmic X-ray background.** Boldt, E.A. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The present knowledge about the overall spectrum of the isotropic extragalactic background of electromagnetic radiation is summarized. The role of the HEAO program is discussed. Spectral measurements from HEAO are examined.

48572 (N—87-24247, pp vp) **X-ray astronomical spectroscopy.** Holt, S.S. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The contributions of the Goddard group to the history of x-ray astronomy are numerous and varied. One role that the group has continued to play involves the pursuit of techniques for the measurement and interpretation of the x-ray spectra of cosmic sources. The latest development is the selection of the x-ray microcalorimeter for the Advanced X-ray Astrophysics Facility (AXAF) study payload. This technology is likely to revolutionize the study of cosmic x-ray spectra.

48573 (N—87-24247, pp vp) **Infrared astronomy.** Hauser, M.G. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The role and contributions of Frank McDonald in extending high energy astrophysics to the sub-eV photon energy range (in putting infrared astronomy into orbit) are discussed.

48574 **(N—87-24266) Star formation in galaxies.** (National Aeronautics and Space Administration, Washington, DC (USA)). May 1987. 755p. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—). NTIS, PC A99/MF E03.

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Topics addressed include: star formation; galactic infrared emission; molecular clouds; OB star luminosity; dust grains; IRAS observations; galactic disks; stellar formation in Magellanic clouds; irregular galaxies; spiral galaxies; starbursts; morphology of galactic centers; and far-infrared observations.

48575 (N—87-24266, pp vp) **High mass star formation in the galaxy.** Scoville, N.Z.; Good, J.C. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Galactic distributions of HI, H_2, and HII regions are reviewed in order to elucidate the high mass star formation occurring in galactic spiral arms and in active galactic nuclei. Comparison of the large scale distributions of H_2 gas and radio HII regions reveals that the rate of formation of OB stars depends on (n/sub H_2/)/sup 1.9/ where (n/sub H_2/) is the local mean density of H_2 averaged over 300 pc scale lengths. In addition the efficiency of high mass star formation is a decreasing function of cloud mass in the range 200,000 to 3,000,000 solar mass. These results suggest that high mass star formation in the galactic disk is initiated by cloud-cloud collisions which are more frequent in the spiral arms due to orbit crowding. Cloud-cloud collisions may also be responsible for high rates of OB star formation in interacting galaxies and galactic nuclei. Based on analysis of the Infrared Astronomy Satellite (IRAS) and CO data for selected GMCs in the Galaxy, the ratio L sub IR/M sub H_2 can be as high as 30 solar luminosity/solar mass for GMCs associated with HII regions. The L/sub IR//M/sub H_2/ ratios and dust temperature obtained in many of the high luminosity IRAS galaxies are similar to those encountered in galactic GMCs with OB star formation. High mass star formation is therefore a viable explanation for the high infrared luminosity of these galaxies.

48576 (N—87-24266, pp vp) **Diffuse infrared emission of the galaxy: large scale properties.** Puget, J.L.; Perault, M.; Boulanger, F.; Falgarone, E. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A quantitative analysis of Infrared Astronomy Satellite (IRAS) data in the galactic plane shows that: about 66% of the power radiated in the 100 micron band comes from the diffuse medium, the other 33% coming from well identified luminous sources. The diffuse emission has almost constant colors throughout the Galaxy, similar to the local cirrus colors. The sources have a much lower 12 micron/25 micron and a much high 60 micron/100 micron emission ratio than the diffuse component, giving a very striking anticorrelation in the color-color diagrams. The separation between one narrow and a second broader component shows that the molecular component does not provide much more than one half of the diffuse emission in the molecular ring: this implies a 4 pi nuI(nu) emissivity at 100 microns for the atomic component of about 2.4 x 10 to the minus 30th watts per H atom, 10 times higher

than the emissivity of the molecular component at the same galactocentric radius. The atomic component emissivity measures the interstellar radiation field density. The temperature distribution of the 2 components is discussed comparing IRAS data with measures of the 900 micron emission of the galactic plane, which appears to be dominated by cold dust in the narrow component.

48577 (N—87-24266, pp vp) **Origin of the diffuse galactic IR/submm emission: revisited after IRAS.** Cox, P.; Mezger, P.G. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Balloon observations are compared with Infrared Astronomy Satellite observations. There was good agreement for the longitudinal profiles. However, the dust emission observed by IRAS, contrary to the balloon observations which show dust emission only within the absolute value of b is equal to or less than 3 degrees, extends all the way to the galactic pole. The model fits were repeated using more recent parameters for the distribution of interstellar matter in the galactic disk and central region. The IR luminosities are derived for the revised galactic distance scale of solar radius - 8.5 Kpc. A total IR luminosity of 1.2 E10 solar luminosity is obtained, which is about one third of the estimated stellar luminosity of the Galaxy. The dust emission spectrum lambdaI(sub lambda) attains it maximum at 100 microns. A secondary maximum in the dust emission spectrum occurs at 10 microns, which contains 15% of the total IR luminosity of the Galaxy. The galactic dust emission spectrum was compared with the dust emission spectra of external IRAS galaxies. The warm dust luminosity relates to the present OB star formation rate, while flux densities observed at longer submm wavelengths are dominated by cold dust emission and thus can be used to estimate gas masses.

48578 (N—87-24266, pp vp) **Masses, luminosities and dynamics of galactic molecular clouds.** Solomon, P.M.; Rivolo, A.R.; Mooney, T.J.; Barrett, J.W.; Sage, L.J. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Star formation in galaxies takes place in molecular clouds and the Milky Way is the only galaxy in which it is possible to resolve and study the physical properties and star formation activity of individual clouds. The masses, luminosities, dynamics, and distribution of molecular clouds, primarily giant molecular clouds in the Milky Way are described and analyzed. The observational data sets are the Massachusetts-Stony Brook CO Galactic Plane Survey and the IRAS far IR images. The molecular mass and infrared luminosities of glactic clouds are then compared with the molecular mass and infrared luminosities of external galaxies.

48579 (N—87-24266, pp vp) **IRAS colors of VLA identified objects in the galaxy.** Fich, M.; Terebey, S. (National Center for Atmospheric Research, Boulder, CO). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Infrared Astronomy Satellite (IRAS) sources found within 4 degrees of l = 125 deg, b = 2 deg on the 3rd HCON 60 micron Sky Brightness Images were observed at the Very Large Array (VLA). Regions were to be identified where massive stars are forming by looking for small areas of radio continuum emissions. The IRAS sources could be divided into three groups by their IRAS 12 micron/25 micron and 60 micron/100 micron color. The group identified with star forming regions contained essentially all of the objects with extended radio emission. In all of these cases the extended radio emission showed a morphology consistent with the identification of these objects as HII regions. The conclusion drawn is that star formation regions can be distinguished from other objects by their infrared colors.

48580 (N—87-24266, pp vp) **Star formation in Carina OB1: observations of a giant molecular cloud associated with the eta Carinae Nebula.** Grabelsky, D.A.; Cohen, R.S.; Thaddeus, P. (Columbia Univ., NY). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A giant molecular cloud associated with the eta Carinae nebula was fully mapped in CO with the Columbia Millimeter-Wave Telescope at Cerro Tololo. The cloud comples has a mass of roughly 700,000 solar mass and extends about 140 pc along the Galactic plane, with the giant Carina HII region situated at one end of the complex. Clear evidence of interaction between the HII region and the molecular cloud is found in the relative motions of the ionized gas, the molecular gas, and the dust; simple energy and momentum considerations suggest that the HII region is responsible for the observed motion of a cloud fragment. The molecular cloud complex appears to be the parent material of the entire Car OB1 Association which, in addition to the young clusters in the Carine nebula, includes the generally older cluster NGC 3325, NGC 3293, and IC 2581. The overall star formation efficiency in the cloud complex is estimated to be approximately 0.02.

48581 (N—87-24266, pp vp) **Star forming regions of the southern galaxy.** Kuiper, T.B.H.; Whiteoak, J.B.; Fowler, J.W. (California Institute of Technology, Pasadena). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A catalog of southern dust cloud properties is being compiled to aid in the planning and analysis of radio spectral line surveys in the southern hemisphere. Ultimately, images of dust temperature and column density will be produced. For the interim, a list of the 60 and 100 micron fluxes was prepared for the cores and adjacent backgrounds of 65 prominent dust clouds. Dust temperatures and column densities were derived.

48582 (N—87-24266, pp vp) **Redistribution of OB star luminosity and the warming of nearby molecular clouds.** Leisawitz, D. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Infrared Astronomy Satellite (IRAS) observations of the neighborhoods of six outer-Galaxy HII regions were combined with CO observations to show that most of the far infrared (FIR) luminosity from within approximately 25 to 75 pc of the ionizing stars is contributed by dust in molecular clouds, not by dust in the low-density ionized gas. Dust associated with the clouds is warmed by absorption of UV and visible light from the cluster of stars responsible for the ionization. Most of the OB cluster starlight is not absorbed locally. A fraction of the order of 10% of the OB cluster luminosity is absorbed by nearby molecular clouds and reradiated as FIR light. The luminosity per unit mass for the heated clouds is approximately 3 to 13 solar luminosity/solar mass, approximately one order of magnitude greater than the corresponding ratio for clouds found near clusters without O stars, and two orders of magnitude greater than the ratio for dark clouds heated primarily by the interstellar radiation field. If the observations of clouds near outer-Galaxy HII regions are used to characterize the molecular clouds heated by HII regions in the inner-Galaxy, then at most 30% of the Galaxy's molecular cloud mass is actively engaged in the formation of massive stars at the present time.

48583 (N—87-24266, pp vp) **Maps of millimeter wave emission from three galactic star-forming regions.** Barsony, M. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

In order to investigate the gas dynamics around young stellar objects, three sources were mapped which exhibit supersonic velocities in the 115 GHZ, J = 1-0 transition of CO. The maps, made with the Owens Valley Radio Observatory Millimeter Inter-

ferometer, are the highest spatial resolution images currently available of millimeter-wave continuum and line emission from the sources S106, S87, and LkHalpha101. Observations were made in the CS (J = 2-1) and C-13O (J = 1-0) transitions. In all the sources, the observations indicate that the ionized stellar wind is sweeping up ambient molecular gas. The molecular gas is found adjacent to the outer edges of the ionized winds, which originate in embedded infrared sources. From the observations presented, it may be inferred that the outflowing ionized winds are channeled by the surrounding dense, neutral gas.

48584 (N—87-24266, pp vp) **Shock heated dust in L1551: L(IR) greater than 20 solar luminosities.** Clark, F.O.; Laureijs, R.J.; Chlewicki, G.; Zhang, C.Y.; Vanoosterom, W.; Kester, D. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The infrared bolometric luminosity of the extended emission from the L1551 flow exceeds 20 solar luminosities. Ultraviolet radiation from the shock associated with the flow appears to heat the dust requiring shock temperatures from 10,000 to 90,000 K in L1551, velocities of approximately 50 km/s near the end of the flow, and a minimum mechanical luminosity of approximately 40 solar luminosities. The total energy requirement of the infrared emission over a 10,000 year lifetime is 10 to the 46th to 47th ergs, two orders of magnitude higher than previous estimates for L1551. Infrared radiation offers a method of probing interstellar shocks, by sampling the untraviolet halo surrounding the shock. At least one current model for bipolar flows is capable of meeting the energetic requirements.

48585 (N—87-24266, pp vp) **Mechanisms for the circular polarization of astrophysical OH masers in star-forming regions and the inferred magnetic fields.** Deguchi, S.; Watson, W.D. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Results of further calculations to explore the cause for the circular polarization of astrophysical OH masers in regions of star formation are presented. Calculations are given for both the nonlinear, Zeeman overlap mechanishm, and the Cook mechanism. The previous result that magnetic field strengths of a few milligauss or greater are required, still survives.

48586 (N—87-24266, pp vp) **Survey of the galactic disk from 1 = -150 deg to 1 = 82 deg in the submillimeter range.** Caux, E.; Serra, G. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The first almost complete survey of the galactic disk from 1 = -150 deg to 1 = 82 deg in the submillimeter range (effective wavelength = 380 microns), performed with the AGLAE balloonborne instrument modified to include a submillimeter channel, is reported. The instrumentation and observational procedures are described, as are the signal processing and calibration. The results are presented as a profile of the submillimeter brightness of the galactic disk displayed as a function of the galactic longitude. This profile exhibits diffuse emission all along the disk with bright peaks associated with resolved sources. The averaged galactic spectrum is in agreement with a temperature distribution of the interstellar cold dust.

48587 (N—87-24266, pp vp) **Diffuse infrared emission of the galaxy: large scale properties.** Perault, M.; Boulanger, F.; Falgarone, E.; Puget, J. L. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Infrared Astronomy Satellite (IRAS) survey is used to study large scale properties and the origin of the diffuse emission of the Galaxy. A careful subtraction of the zodiacal light enables longitude profiles of the galactic emission at 12, 25, 60, and 100 microns to be presented.

48588 (N—87-24266, pp vp) **Large scale gas and dust distribution in the galaxy: implications for star formation.** Sodroski, T.J.; Dwek, E.; Hauser, M.G.; Kerr, F.J. (Maryland Univ., College Park). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Infrared Astronomy Observations are presented for the diffuse infrared (IR) emissions from the galactic plane at wavelengths of 60 and 100 microns and the total far infrared intensity and its longitudinal variations in the disk were derived. Using available CO, 5 GHz radio-continuum, and HI data, the IR luminosity per hydrogen mass and the ingrared excess (IRE) ratio in the Galaxy were derived. The longitudinal profiles of the 60 and 100 micron emission were linearly decomposed into three components that are associated with molecular (H_2), neutral (HI), and ionized (HII) phases in the interstellar medium (ISM), and the relevant dust properties were derived in each phase. Implications of the findings for various models of the diffuse IR emisison and for star formation in the galactic disk are discussed.

48589 (N—87-24266, pp vp) **Correlation between the IRAS infrared cirrus at 60 or 100 microns and neutral atomic hydrogen in the outer galaxy.** Terebey, S.; Fich, M. (Washington Univ., Seattle). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A linear correlation was found between the infrared cirrus at 100 or 60 microns and neutral atomic hydrogen near the galactic plane. Infrared Astronomy Satellite (IRAS) Sky Brightness images were compared to the 0.5 deg resolution Weaver-Williams HI survey in two regions of the outer Galaxy near l = 125 deg and l = 215 deg. The dust temperature inferred is nearly uniform and in reasonable agreement with theoretical predictions of thermal dust emission.

48590 (N—87-24266, pp vp) **Arp ring: galactic or extragalactic?.** Abolins, J.A.; Rice, W.L. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Arp Ring is a faint, loop-like structure around the northern end of M81 which becomes apparent only on deep optical photographs of the galaxy. The nature of the Ring and its proximity to M81 are uncertain. Is it simply foreground structure, part of this galaxy, or is it within the M81 system? Infrared Astronomy Satellite (IRAS) maps of the region show a far-infrared counterpart of the Ring. The infrared data are compared with previous optical and radio observations to try to ascertain its physical nature. The poor correlation found between the common infrared/optical structure and the distribution of extragalactic neutral hydrogen, and the fact that its infrared properties are indistinguishable from those of nearby galactic cirrus, imply that the Arp Ring is simply a ring structure in the galactic cirrus.

48591 (N—87-24266, pp vp) **Infrared properties of dust grains derived from IRAS observations.** Chlewicki, G.; Laureijs, R.J.; Clark, I.O.; Wesselius, P.R. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The analysis of several diffuse interstellar clouds observed by the Infrared Astronomy Satellite (IRAS) is presented. The 60/100 micron flux ratios appear to be nearly constant in clouds with up to 1 sup m visual extinction at the center. Observations of a highly regular cloud in Chamaeleon show that the 12/100 micron ratio peaks at an intermediate radial distance and declines towards the center of the cloud. These observations indicate that nonequilibrium emission accounts only for the 12 and 25 micron bands; strong emission observed at the 60 micron band is probably due to equilibrium thermal radiation. The correlation of the 12 micron emission with a red excess observed for a high latitude cloud,

L1780, is shown to be consistent with the assumption that both features are due to fluorescence by the same molecular species.

48592 (N—87-24266, pp vp) **IRAS observations of the Pleiades.** Cox, P.; Leene, A. (Kapteyn Astronomical Lab., Groningen, Netherlands). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Infrared Astronomy Satellite (IRAS) observations of the Pleiades region are reported. The data show large flux densities at 12 and 25 microns, extended over the optical nebulosity. This strong excess emission, implying temperatures of a few hundred degrees Kelvin, indicates a population of very small grains in the Pleiades. It is suggested that these grains are similar to the small grains needed to explain the surface brightness measurements made in the ultraviolet.

48593 (N—87-24266, pp vp) **Models for infrared emission from IRAS galaxies.** Rowan-Robinson, M. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Models for the infrared emission from Infrared Astronomy Satellite (IRAS) galaxies by Rowan-Robinson and Crawford, by deJong and Brink, and by Helou, are reviewed. Rowan-Robinson and Crawford model the 12 to 100 micron radiation from IRAS galaxies in terms of 3 components: a normal disk component, due to interstellar cirrus; a starburst component, modeled as hot stars in an optically thick dust cloud; and a Seyfert component, modeled as a power-law continuum immersed in an n(r) variation r sup -1 dust cloud associated with the narrow-line region of the Seyfert nucleus. The correlations between the luminosities in the different components, the blue luminosity, and the X-ray luminosity of the galaxies are consistent with the model. Spectra from 0.1 to 1000 microns are predicted and compared with available observations. The de Jong and Brink, and Helou, model IRAS non-Seyfert galaxies in terms of a cool (cirrus) component and a warm (starburst) component. The de Jong and Brink estimate the face-on internal extinction in the galaxies and find that it is higher in galaxies with more luminous starbursts. In Helou's model the spectrum of the warm component varies strongly with the luminosity in that component. The three models are briefly compared.

48594 (N—87-24266, pp vp) **Origin of the 40-120 micron emission of galaxy disks: A comparison with H-alpha fluxes.** Persson, C.J.L.; Helou, G. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A comparison of 40 to 120 micron Infrared Astronomy Satellite (IRAS) fluxes with published H alpha and UBV photometry shows that the far infrared emission of galaxy disks consists of at least two components: a warm one associated with OB stars in HII-regions and young star-forming complexes, and a cooler one from dust in the diffuse, neutral interstellar medium, heated by the more general interstellar radiation field of the old disk population (a cirrus-like component). Most spiral galaxies are dominated by emission from the cooler component in this model. A significant fraction of the power for the cool component must originate with non-ionizing stars. For a normal spiral disk there is a substantial uncertainty in a star formation rate derived using either the H alpha or the far infrared luminosity.

48595 (N—87-24266, pp vp) **Star formation in the Magellanic clouds.** Frogel, J.A. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Because of their proximity, the Magellanic Clouds provide the opportunity to conduct a detailed study of the history and current state of star formation in dwarf irregular galaxies. There is considerable evidence that star formation in the Clouds was and is proceeding in a manner different from that found in a typical well-ordered spiral galaxy. Star formation in both Clouds appears to have undergone a number of relatively intense bursts. There exist a number of similarities and differences in the current state of star formation in the Magellanic Clouds and the Milky Way. Examination of Infrared Astronomy Satellite (IRAS) sources with ground based telescopes allows identification of highly evolved massive stars with circumstellar shells as well as several types of compact emission line objects.

48596 (N—87-24266, pp vp) **Measuring star formation rates in blue galaxies.** Gallagher, J.S. III; Hunter, D.A. (Carnegie Institution of Washington, DC). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The problems associated with measurements of star formation rates in galaxies are briefly reviewed, and specific models are presented for determinations of current star formation rates from H alpha and Far Infrared (FIR) luminosities. The models are applied to a sample of optically blue irregular galaxies, and the results are discussed in terms of star forming histories. It appears likely that typical irregular galaxies are forming stars at nearly constant rates, although a few examples of systems with enhanced star forming activity are found among HII regions and luminous irregular galaxies.

48597 (N—87-24266, pp vp) **CO observations of galaxies with the Nobeyama 45-M telescope.** Sofue, Y.; Handa, T.; Hayashi, M.; Nakai, N. (Nobeyema Solar Radio Observatory, Japan). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

High-resolution (15 inch), filled aperture maps of the CO (J = 1-0) line emission were obtained for several nearby, CO-bright galaxies like M82, M83, IC342, and NGC891 in order to study star forming activity in these galaxies.

48598 (N—87-24266, pp vp) **CO observations of nearby galaxies and the efficiency of star formation.** Young, J.S. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The CO distributions and total molecular content of 160 galaxies were observed using the 14 meter millimeter telescope of the FCRAO. For the luminous, relatively face-on Sc galaxies, the azimuthally averaged CO distributions are centrally peaked, while for the Sb and Sa galaxies the CO distributions often exhibit central CO holes up to 5 kpc across. None of the Sc galaxies have CO distributions which resemble the Milky Way. A general correlation was found between total CO and IR luminosities in galaxies. The scatter in this relation is highly correlated with dust temperature. No strong correlation of IR luminosities was found with HI masses, and it was thereby concluded that the infrared emission is more directly tied to the molecular content of galaxies. It is suggested that galaxies which have high Star Formation Effiencies (SFEs) produce more stars per unit molecular mass, thereby increasing the average temperature of the dust in the star forming regions. Irregular galaxies and galaxies previously identified as mergers have the highest observed star formation efficiencies. For the mergers, evidence was found that the IR/CO luminosity ratio increases with the merger age estimated by Joseph and Wright (1985).

48599 (N—87-24266, pp vp) **Submm observations of IRAS galaxies.** Chini, R.; Kreysa, E.; Kruegel, E.; Mezger, P.G. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Twenty-six galaxies from the Infrared Astronomy Satellite (IRAS) point source catalog were observed at 250 and 1300 microns. The Far Infrared (FIR) spectra from 25 to 1300 microns are interpreted in terms of two dust components of about 16 and 53 K. Flux densities at 1300 microns are used to estimate the total gas

mass M sub g. The warm dust luminosity L sup W is considered to be proportional to M sub g sup 0.9 in the mass range 3 x 10 to the 8th is equal to or less than M sub g/solar mass is equal to or less than 10 to the 12th power. The efficiency of star formation seems to be four times higher in barred and peculiar galaxies than in Sc types.

48600 (N—87-24266, pp vp) **Stellar bars and the spatial distribution of infrared luminosity.** Devereux, N. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Ground-based 10 micron observations of the central region of over 100 infrared luminous galaxies are presented. A first order estimate of the spatial distribution of infrared emission in galaxies is obtained through a combination of ground-based and Infrared Astronomy Satellite (IRAS) data. The galaxies are nearby and primarily noninteracting, permitting an unbiased investigation of correlations with Hubble type. Approximately 40% of the early-type barred galaxies in this sample are associated with enhanced luminosity in the central (approximately 1 kpc diameter) region. The underlying luminosity source is attributed to both Seyfert and star formation activity. Late-type spirals are different in that the spatial distribution of infrared emission and the infrared luminoisty are not strongly dependent on barred morphology.

48601 (N—87-24266, pp vp) **Star formation and spiral structure in M81.** Kaufman, M.; Bash, F.N. (Texas Univ., Austin). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

High resolution digitized images of M81 in the radio continuum, H alpha, H I, and I band are used to see how well various density wave models agree in detail with observations. It was found that the observed width of the nonthermal radio arms favors a cloudy version of a density wave model. The radial distribution of the set of giant radio H II regions disagrees with the simple expression of Shu and Visser for star formation by a density wave. The observed displacements of the giant radio H II regions from the spiral velocity shock indicate that some revisions in the details of the ballistic particle model of Leisawitz and Bash are necessary.

48602 (N—87-24266, pp vp) **HII regions in M51: radio and optical observations.** Vanderhulst, J.M.; Kennicutt, R.C. Jr. (Minnesota Univ., Minneapolis). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

High resoluton, dual frequency radio observations and calibrated H alpha surface photometry of the spiral galaxy M51 are used to determine the physical properties of the 40 brightest HII region complexes. M51 appears to have a normal HII region population when compared with other nearby Sc galaxies for which good data exist. The radio and H alpha data were used to measure the extinction toward the HII regions. The extinction is very patchy but appears to have a weak trend to become on the average smaller toward large galactocentric radii. This trend is consistent with a possible metallicity gradient in M51. The radio determined extinctions were compared with Balmer decrement extinctions and good agreement was found between the two, contrary to previous studies of M51 and other galaxies.

48603 (N—87-24266, pp vp) **IRAS and ground-based observations of star formation regions in the Magellanic clouds.** Elias, J.H.; Frogel, J.A. (Kitt Peak National Observatory, Tucson, AZ). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Infrared Astronomy Satellite (IRAS) detected several hundred individual regions of star formation in the Large and Small Magellanic Clouds. Nearly two dozen of the brightest such sources were searched for from the ground at 10 microns; most of these were located and measured at wavelengths from 0.6 to 20 microns. Three principle results emerge from this study: First, the IRAS data show that star formation is considerably less active in the SMC than in the LMC, relative either to mass, luminosity, or H I content. The reduced activity in the SMC is consistent with the smaller amount of molecular material inferred from CO observations. Second, the sizes of the objects range from less than a few arcsecs (objects which look like extremely compact HII regions, with little or no extended radio, optical, or infrared emission) to some tens of arcsecs across (giant HII regions, of which the largest and brightest is 30 Doradus). Third, there are no obvious differences in the characteristics of the central portions of the LMC and SMC sources; all look like Galactic H II regions of similar luminosity.

48604 (N—87-24266, pp vp) **Star formation in the large Magellanic cloud.** Jones, T.J.; Hyland, A.R.; Harvey, P.M. (Texas Univ., Austin). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

What role the Large Magellanic Cloud (LMC), a dwarf irregular galaxy, plays in understanding infrared luminous galaxies is discussed. There are two main reasons the LMC may prove helpful. One, the LMC is only 55 kpc away, very nearby compared to much rarer high luminosity systems. Second, the environment in the LMC is distinctly different than in the Milky Way, at least those parts of the Milky Way interior to the sun, where most of the studies of massive star formation were concentrated. The LMC is an interacting system with a large amount of neutral hydrogen that is pushed around by the galaxy's encounter with the Milky Way. Perhaps a good understanding of star formation process in the LMC will provide guidance in the study of the infrared luminous galaxies. Two questions which will be addressed are: how is star formation in the LMC similar to the Milky Way Galaxy, and how is it different?

48605 (N—87-24266, pp vp) **Infrared emission and excitation in LMC HII regions.** Ungerer, V.; Viallefond, F. (Observatoire de Paris-Meudon, France). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The infrared excess (IRE) of the Large Magellanic Cloud (LMC) HII nebulae is found to correlate positively with the temperature of the ambient radiation field or with the He(+)/H(+) abundance ratio. This result is discussed in terms of a selective absorption of the photons in the range 504 to 912 A relative to the He ionizing photons. This interpretation may explain the paradox of finding highly excited nebulae with only relatively moderate equivalent width of their Balmer lines.

48606 (N—87-24266, pp vp) **IRAS observations of irregular galaxies.** Hunter, D.; Rice, W.; Gallagher, J.; Gillett, F. (Kitt Peak National Observatory, Tucson, AZ). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Normal irregular galaxies seem to be unusual in having vigorous star formation yet lacking the many dark nebulae typical of spirals. The Infrared Astronomy Satellite (IRAS) observations of a large sample of irregulars are used to explore the dust contents of these galaxies. Compared to normal spirals, the irregulars generally have higher L sub IR/L sub B ratios, warmer f(100)/f(60) dust color temperatures, and lower globally-averaged dust/gas ratios. The relationship between the infrared data and various global optical properties of the galaxies is discussed.

48607 (N—87-24266, pp vp) **Erratum: IRAS observations of irregular galaxies.** Hunter, D.A.; Gallagher, J.S. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

In Infrared Astronomy Satellite (IRAS) observations of irregular galaxies, galactic blue luminosities were based on standard optical definitions. The blue luminosities (L sub B) were derived from the blue absolute magnitude (M sub B) or form the in band flux. However, the L sub B system for spiral galaxies was based on quasi-bolometric (rather than in band) fluxes. The formulation and resulting statements are corrected.

48608 (N—87-24266, pp vp) **IUE observations of luminous blue star associations in irregular galaxies.** Lamb, S.A.; Hunter, D.A.; Gallagher, J.S. III. (Kitt Peak National Observatory, Tucson, AZ). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Two regions of recent star formation in blue irregular galaxies were observed with the IUE in the short wavelength, low dispersion mode. The spectra indicate that the massive star content is similar in these regions and is best fit by massive stars formed in a burst and now approximately 2.5 to 3.0 million years old.

48609 (N—87-24266, pp vp) **Neutral hydrogen and star formation in irregular galaxies.** Skillman, E.D. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Very Large Array and WSTR H I synthesis observations of seven irregular galaxies are presented. The total H I images of four Local Group dwarf irregular galaxies and three larger more distant irregular galaxies are constructed at the identical resolution of 500 pc. When compared to H II region distributions derived from H alpha images, all galaxies studied show an excellent correlation between the H I surface density and the presence of H II regions. This correlation is most easily interpreted in terms of a requisite threshold H I surface density for massive star formation. This threshold is 1 x 10 to the 21st power H I atoms/sq cm for a resolution of 500 pc. Giant extragalactic H II regions are only found near H I surface densities of a factor of 3 to 5 times this threshold level. The observed threshold implies a Jeans length of 150 pc, which is the same as the size scale at which the structure in the H I complexes correlates well with the H II region distribution. This, combined with the fact that in none of the galaxies observed is there H I above the threshold level with concomitant H II regions, implies an exclusively gravitational origin for the star formation events. That is, there is no need to involve a trigger as in the SSPSF theory (Seiden 1983) or feedback as in Dopita (1985).

48610 (N—87-24266, pp vp) **Carbon monoxide emission from small galaxies.** Thronson, H.A. Jr.; Bally, J. (Bell Telephone Labs., Inc., Murray Hill, NJ). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A search was conducted for J = 1 yields 0 CO emission from 22 galaxies, detecting half, as part of a survey to study star formation in small to medium size galaxies. Although substantial variation was found in the star formation efficiencies of the sample galaxies, there is no apparent systematic trend with galaxy size.

48611 (N—87-24266, pp vp) **Characteristics of UGC galaxies detected by IRAS.** Persson, C.J.L.; Rice, W.; Bothun, G.D. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Infrared Astronomy Satellite (IRAS) detection rates at 60 microns were determined for the Uppsala General Catalog of Galaxies (Nilson 1973; the UCG). Late-type spirals, characterized by a normal IR/B ratio of approximately 0.6, are detected to a velocity of approximately 6000 km/s for L sub B = L sub *. Contrary to the situation for IRAS-selected galaxy samples, little evidence was found for a correlation between IR/B and 60/100 microns in this large optically-selected sample. Thus a significant fraction of the IRAS-measured far-infrared flux from normal spirals must originate in the diffuse interstellar medium, heated by the interstellar radiation field. Support was not found for Burstein and Lebofsky's (1986) conclusion that spiral disks are optically thick in the far-infrared.

48612 (N—87-24266, pp vp) **Far-infrared properties of cluster galaxies.** Bicay, M.D.; Giovanelli, R. (Stanford Univ., CA). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Far-infrared properties are derived for a sample of over 200 galaxies in seven clusters: A262, Cancer, A1367, A1656 (Coma), A2147, A2151 (Hercules), and Pegasus. The IR-selected sample consists almost entirely of IR normal galaxies, with Log of L(FIR) = 9.79 solar luminosities, Log of L(FIR)/L(B) = 0,79, and Log of S(100 microns)/S(60 microns) = 0.42. None of the sample galaxies has Log of L(FIR) greater than 11.0 solar luminosities, and only one has a FIR-to-blue luminosity ratio greater than 10. No significant differences are found in the FIR properties of HI-deficient and HI-normal cluster galaxies.

48613 (N—87-24266, pp vp) **Present star formation in sprials of the Virgo cluster.** Guiderdoni, B. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

From a study of spiral galaxies in the Virgo Cluster (VC), it is shown that the RDDO anemics with smooth arms and no sign of present formation of (massive) stars have HI surface densities below a threshold value of 2 to 5 x 10 to the 20th power atoms/sq cm. This value is very consistent with predictions of theoretical models. It is likely that the HI disks of VC HI-deficient RDDO anemics were deeply affected by ram pressure stripping in the gaseous intracluster medium, while VC HI deficient RDDO spirals were only peripherally stripped.

48614 (N—87-24266, pp vp) **Molecular gas and star formation in HI-deficient Virgo cluster galaxies.** Kenney, J.D.; Young, J.S. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Mapping of the CO emission line in 42 Virgo cluster galaxies reveals that the molecular gas contents and distributions are roughly normal in severaly HI-deficient Virgo spirals. The survival of the molecular component mitigates the impact of the HI-stripping on star formation and subsequent galactic evolution. For spirals which are deficient in HI by a factor of 10, far-infrared, H alpha line, and nonthermal radio continuum luminosities are lower by no more than a factor of 2. The fact that the inner galactic disks are stripped of HI, while CO is normal, suggests that the lifetime of the molecular phase is approximately one billion years in the inner regions of luminous spirals.

48615 (N—87-24266, pp vp) **Star formation rates as a function of galaxy mass.** Romanishin, W. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Correlations were found between the colors and absolute magnitudes of spiral galaxies. Using optical and/or near IR (1.6 micron) colors, it was found that lower luminosity spirals are systematically bluer than higher luminosity spirals. Infrared Astronomy Satellite (IRAS) far IR luminosities were used to investigate the suggestion that one prime cause of these color-absolute magnitude correlations is a systematic variation with galaxy mass of the current star formation rate (SFR) per unit mass. To the extent that the IRAS fluxes actually measure disk SFR, no correlation of SFR/unit mass and galaxy mass was found. Other possible explanations of the color-absolute magnitude correlations are discussed, as well as caveats on the use of IRAS fluxes as a means of comparing SFRs in galaxies of differing mass.

48616 (N—87-24266, pp vp) **Global properties of the nearby spiral M101.** Beichman, C.; Boulanger, F.; Rice, W.; Persson, C.J.L.; Viallefond, F. (Institut d'Astrophysique, Paris, France). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

M101 (NGC 5457) is a classic Sc I spiral galaxy located sufficiently nearby, 6.8 Mpc, that its structure can be studied even with the coarse angular resolution of the Infrared Astronomy Satellite (IRAS). The global infrared properties of M101 are addressed including the radial dependence of its infrared emission.

48617 (N—87-24266, pp vp) **Efficient star formation in the bright bar of M83.** Lord, S.D.; Strom, S.E.; Young, J.S. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The bright molecular bar in M83 was detected standing out as a 100% enhancement of molecular emission with respect to the off-bar emission at the same radii. The spatial variations in the star formation efficiency, as traced by H alpha emission and the surface density of the interstellar gas, in M83 and M51 were compared. Both the central bar of M83 and the spiral arms of M51 are regions characterized by high massive star formation rates. For M83, it is ascribed that both the gas surface density and the star formation efficiency are high to the hydrodynamics of the central region.

48618 (N—87-24266, pp vp) **Large scale dissociation of molecular gas in the sprial arms of M51.** Tilanus, R.P.J.; Allen, R.J. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The distribution of the atomic and ionized hydrogen along the inner spiral arms of M51 are compared. As is the case in M83, the location of both these phases of the interstellar medium with respect to the major dust lanes suggests that molecular hydrogen is dissociated on kpc scales in active star-forming regions, and that this dissociation process may strongly affect the observed morphology of atomic hydrogen in spiral arms.

48619 (N—87-24266, pp vp) **Structure and kinematics of the molecular spiral arms in M51.** Rydbeck, G.; Hjalmarson, A.; Johansson, L.E.B.; Rydbeck, O.E.H.; Wiklind, T. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Mapping of the CO(1-0) emission from the spiral galaxy was made with the Onsala 20 m antenna. The observations show that the emission is considerably enhanced in spiral arms which appear to originate as intense ridges of emission about 1 kpc from the nucleus. One of the main objectives for the 1986 observations was to study the variations of the tangential velocity component of molecular gas across a spiral arm. The radial velocity was found to have a velocity shift similar to that predicted by the density wave theory. The present (1986) observations of the inner southern spiral arm of M51 show that the tangential velocity component also behaves in a way which conforms with the density wave model. The molecular arms were compared with the H alpha ionized gas arms of Tully (1974) and it was found that the ionized gas appears to have its maximum intensity slightly outside the molecular arm.

48620 (N—87-24266, pp vp) **Modelling the IRAS colors of galaxies.** Helou, G. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A physical interpretation is proposed for the color-color diagram of galaxies which are powered only by star formation. The colors of each galaxy result from the combination of two components: cirrus-like emission from the neutral disk, and warmer emission from regions directly involved in on-going star formation. This approach to modelling the emission is based on dust properties, but independent evidence for it is found in the relation between the color sequence and the luminosity sequence. Implications of data and interpretations are discussed and possible tests mentioned for the model.

48621 (N—87-24266, pp vp) **Simple two-component model for the far-infrared emission from galaxies.** Dejong, T.; Brink, K. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A simple model was constructed to calculate the far-infrared emission of galaxies made up of a disk component containing cool dust heated by the general interstellar radiation field and of a molecular cloud component containing warm dust heated by recently formed massive stars. This model is fitted to the optical and far-infrared data of 120 Shapley-Ames galaxies and of 20 optically studied mini-survey galaxies, resulting in the determination of blue face-on extinctions and of the total luminosities of recently born massive stars and disk stars. The ratio of these two luminosities is a more reliable star formation activity index than the previously used ratio L sub IR/L sub B. The results show that infrared selected galaxies are on the average almost three times more dusty than optically selected ones. Only about 10% of the mini-survey galaxies exhibits strongly enhanced star formation.

48622 (N—87-24266, pp vp) **Detection of CO (J=1-0) in the dwarf elliptical galaxy NGC 185.** Wiklind, T.; Rydbeck, G. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The detection of CO (J = 1-0) emission in the dwarf elliptical galaxy NGC 185 is reported. The presence of massive molecular clouds in this early-type galaxy supports the idea of recent or ongoing stellar formation indicated by the population of blue stars in the center. The CO was detected in two positions in the galaxy, the center, and a prominent dustcloud. The emission profile has two peaks, roughly centered around the systemic velocity. It is found that NGC 185 is overluminous in blue light for its CO luminosity compared with Sc galaxies. This might indicate a higher star-formation efficiency for NGC 185 than for the late-type galaxies.

48623 (N—87-24266, pp vp) **Star forming regions in gas-rich SO galaxies.** Pogge, R.W.; Eskridge, P.B. (Washington Univ., Seattle). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The first results of an H alpha imaging survey of HI rich SO galaxies, which were searched for HII regions and other sources of emission, are presented. The charge coupled device H alpha interference filter images were made of 16 galaxies. Eight of these galaxies show evidence for on-going star formation, one has nuclear emission but no HII regions, and the remaining seven have no emissions detected within well defined upper limits. With the exception of one notably peculiar galaxy in which the emission from HII regions appears pervasive, the HII regions are either organized into inner-disk rings or randomly distributed throughout the disk. A few of these galaxies are found to be clearly not SO's; or peculiar objects atypical of the SO class. Using simple models star formation rates (SFRs) and gas depletion times from the observed H alpha fluxes were estimated. In general, the derived SFRs are much lower than those found in isolated field spiral galaxies and the corresponding gas depletion time scales are also longer.

48624 (N—87-24266, pp vp) **Simple theory of bimodal star formation.** Wyse, R.F.G.; Silk, J. (California Univ., Berkeley). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A model of bimodal star formation is presented, wherein massive stars form in giant molecular clouds (GNC), at a rate regulated by supernovae energy feedback through the interstellar

medium, the heat input also ensuring that the initial mass function (IMF) remains skewed towards massive stars. The low mass stars form at a constant rate. The formation of the GMC is governed by the dynamics of the host galaxy through the rotation curve and potential perturbations such as a spiral density wave. The characteristic masses, relative normalizations, and rates of formation of the massive and low mass modes of star formation may be tightly constrained by the requirements of the chemical evolution in the Solar Neighborhood. Good fits were obtained for the age metallicity relation and the metallicity structure of thin disk and spheroid stars only for a narrow range of these parameters.

48625 (N—87-24266, pp vp) **History of gas in sprial galaxies.** Maloney, P. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The general association of luminous young stars with spiral arms in galaxies has led to widespread acceptance of the idea that the formation of massive stars, at least, is somehow triggered by the interaction of interstellar gas clouds with a spiral density wave. A very simple model for the gas in a spiral galaxy, with a specified initial surface density and angular velocity is examined. Typical results from this simple model, with parameters appropriate to NGC 6946, are shown. The accuracy of the presumption that the molecular gas distributions in galaxies is based upon observations of CO J = 1-0 emission, is discussed.

48626 (N—87-24266, pp vp) **Starburst galaxies.** Weedman, D.W. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The infrared properties of star-forming galaxies, primarily as determined by the Infrared Astronomy Satellite (IRAS), are compared to x ray, optical, and radio properties. Luminosity functions are reviewed and combined with those derived from optically discovered samples using 487 Markarian galaxies with redshifts and published IRAS 60 micron fluxes, and 1074 such galaxies in the Center for Astrophysics redshift survey. It is found that the majority of infrared galaxies which could be detected are low luminosity sources already known from the optical samples, but non-infrared surveys have found only a very small fraction of the highest luminosity sources. Distributions of infrared to optical fluxes and available spectra indicate that the majority of IRAS-selected galaxies are starburst galaxies. Having a census of starburst galaxies and associated dust allow severl important global calculations. The source counts are predicted as a function of flux limits for both infrared and radio fluxes. These galaxies are found to be important radio sources at faint flux limits. Taking the integrated flux to z = 3 indicates that such galaxies are a significant component of the diffuse x ray background, and could be the the dominant component depending on the nature of the x ray spectra and source evolution.

48627 (N—87-24266, pp vp) **Infrared spectroscopy of star formation in galaxies.** Beck, S.C.; Ho, P.T.P.; Turner, J.L. (Harvard-Smithsonian Center for Astrophysics, Cambridge, MA). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Brackett alpha and beta lines with 7.2 seconds angular and 350 km/s velocity resolution were observed in 11 infrared-bright galaxies. From these measurements extinctions, Lyman continuum fluxes, and luminosities due to OB stars were derived. The galaxies observed to date are NGC3690, M38, NGC 5195, Arp 220, NGC 520, NGC660, NGC1614, NGC 3079, NGC 6946, NGC 7714, and Maffei 2, all of which were suggested at some time to be starburst ogjects. The contributions of OB stars to the luminosities of these galaxies can be quantified from the measurements and range from insignificant to sufficient to account for the total energy output. The OB stellar luminosities observed are as high as 10 to the 12th solar luminosities in the galaxy NGC 1614. It is noteworthy that star formation can play very different roles in the infrared energy output of galaxies of similar luminosity, as for example Arp 220 and NGC 1614. In addition to probing the star formation process in these galaxies, the Brackett line measurements, when compared to radio and infrared continuum results, have revealed some unexpected and at present imperfectly understood phenomena: in some very luminous sources the radio continuum appears to be suppressed relative to the infrared recombination lines; in many galaxies there is a substantial excess of 10 micron flux over that predicted from simple models of Lyman alpha heating of dust if young stars are the only significant energy source.

48628 (N—87-24266, pp vp) **Molecular gas in the starburt nucleus of M82.** Lo, K.Y. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The 7″ resolution CO observations of the central 1 kpc of M82 have resolved 2 components of molecular gas: (1) a high concentration in the central 700 pc x 200 pc, and (2) extended features that may be gas expelled from the central concentration. The central concentration of molecular gas falls in the same confines as the other tracers of recent star formation, and may be identified directly with the star burst region. The molecular gas in the star burst nucleus of M82 appears to be highly disturbed and has high kinetic temperature, likely consequences of the high density of young star clusters. Stellar winds and subsequent supernovae from the star clusters can effectively sweep up the interstellar medium. The spatial distribution and kinematics of the nuclear concentration of the molecular gas, as well as the 2 micron light distribution, suggest the presence of a stellar bar in M82. Comparisons of the M82 star burst nucleus to a sample of IR luminous galaxies suggest that star burst regions in general may have a higher gas temperature and much higher L sub IR/M sub H_2 that the galactic disk, and that the L sub IR of the star burst regions may be essentially proportional to their area.

48629 (N—87-24266, pp vp) **Nuclear star formation on 100 parsec scales: 10″ resolution radio continuum, HI and CO observations.** Turner, J.L.; Ho, P.T.P.; Martin, R.N. (Arizona Univ., Tucson). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A program of radio line and continuum studies of star formation in nearby spiral galaxies is reported. The objective is a search for hot gas and peculiar dynamics in spiral nuclei with 10″ to 30″ angular resolution. Vigorous star formation is found to be a common phenomenon in the inner kpc of spirals. Arcsecond resolution observations of radio continuum emission at 6 and 2 cm were used to separate the thermal and nonthermal radio components. It was found that thermal and nonthermal emission are well mixed even on sizescales of 10 pc. To understand the reason for the increased level of star formation activity in spiral nuclei, HI and CO emission in these galaxies is studied. The CO transition was detected in M51, M82, NGC 253, NGC 6946 and IC 342 with T sub a approx. 0.5 to 2.0 K, at 20″ angular resolution. The dynamics and spatial distribution of nuclear gas are being studied using VLA HI maps with 30″ synthesized beams. Evidence for noncircular motions in HI was found in the nucleus of IC 342.

48630 (N—87-24266, pp vp) **Extremely Luminous Far-infrared Sources (ELFS).** Harwit, M.; Houck, J.R.; Soifer, B.T.; Palumbo, G.G.C. (California Institute of Technology, Pasadena). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The Infrared Astronomical Satellite (IRAS) survey uncovered a class of Extremely Luminous Far Infrared Sources (ELFS), exhibiting luminosities up to and occasionally exceeding 10 to the 12th power L sub 0. Arguments are presented to show that sources with luminosities L equal to or greater than 3 x 10 to the 10th power L sub 0 may represent gas rich galaxies in collision. The more conventional explanation of these sources as sites of extremely active star formation fails to explain the observed low optical luminosities of ELFS as well as their high infrared excess. In contrast, a collisional model heats gas to a temperature of approx. 10 to

the 6th power K where cooling takes place in the extreme ultraviolet. The UV is absorbed by dust and converted into far infrared radiation (FIR) without generation of appreciable optical luminosity. Gas recombination as it cools generates a Lyman alpha photon only once for every two extreme ultraviolet approx. 50eV photons emitted by the 10 to the 6th power gas. That accounts for the high infrared excess. Finally, the model also is able to explain the observed luminosity distribution of ELFS as well as many other traits.

48631 (N—87-24266, pp vp) **Star formation and dynamics in starburst nuclei.** Norman, C.A. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A simple model is presented for gas inflow through a disk galaxy driven by interacting galaxies through the action of a nonaxisymmetric disturbance acting on the disk whose gas is modelled as an ensemble of gas clouds. Cloud collisions, as well as being a vital process in forcing gas inflow to the center of the disk, are also assumed to generate massive stars. This ever increasing rate of gas flow toward the center of the galaxy and the associated rapid increase in cloud collisions lead to a centrally concentrated starburst. Starbursts have important consequences for the immediate environment of galaxies. Mildly collimated outflows can be driven by a combination of multiple supernovae and OB star winds. Jets associated with activity in the galactic nucleus can interact strongly with a starburst environment.

48632 (N—87-24266, pp vp) **Induced star formation in interacting galaxies.** Kennicutt, R.C.; Roettiger, K.A.; Keel, W.C.; Vanderhulst, J.M.; Hummel, E. (Max-Planck-Institute fuer Radioastronomie, Bonn, West Germany). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Measurements of H alpha emission line fluxes and FIR fluxes in approx. 100 interacting spirals were used to investigate the effects of close tidal interactions on the disk and nuclear star formation rates in galaxies. Two samples of interacting spirals were studied, a complete sample of close pairs, and a set of strongly perturbed systems from the Arp atlas. Both the integrated H alpha luminosities and FIR luminosities are enhanced in the interacting galaxies, indicating that the encounters indeed trigger massive star formation in many cases. The response of individual galaxies is highly variable, however. A majority of the interacting spirals exhibit normal star formation rates, while a small fraction are undergoing bursts with luminosities which are rarely, if ever, observed in noninteracting systems. Virtually all of the latter are in the Arp sample, indicating that the Arp atlas is heavily biased to the most active star forming systems.

48633 (N—87-24266, pp vp) **Frequency of enhanced star formation in interacting and isolated galaxies.** Cutri, R.M. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

To probe the sensitivity of the star formation rate and extent in galaxies to gravitational encounters, ground based near and mid-infrared and IRAS far-infrared measurements of complete samples of isolated and interacting pairs of galaxies were obtained. The observed infrared properties of the isolated galaxies are used to gauge the magnitude of star formation in galaxies free from external influences, and to define the relationships between morphological type and infrared luminosity. These properties were contrasted with those of the interacting sample to examine the extent to which interactions can enhance or alter the nature of star formation. The mechanisms by which interactions influence activity such as star formation are investigated through correlations of the infrared characteristics with radio and optical measurements, and with morphological and physical parameters such as galaxy types, separations, encounter velocities and interaction types. Limits to the physical extent of the star formation are obtained by comparing the large aperture measurements of IRAS with the small aperture ground based photometry.

48634 (N—87-24266, pp vp) **Ultraluminous infrared galaxies.** Sanders, D.B.; Soifer, B.T.; Neugebauer, G.; Scoville, N.Z.; Madore, B.F.; Danielson, G.E.; Elias, J.H.; Matthews, K.; Persson, C.J.; Persson, S.E. (Mount Wilson Observatory, Pasadena, CA). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The IRAS survey of the local universe has revealed the existence of a class of ultraluminous infrared galaxies with L(8 to 1000 micrometer) greater than 10 to the 12th L sub 0 that are slightly more numerous, and as luminous as optically selected quasars at similar redshift. Optical CCD images of these infrared galaxies show that nearly all are advanced mergers. Millimeter wave CO observations indicate that these interacting systems are extremely rich in molecular gas with total H_2 masses 1 to 3 x 10 to the 10th power M sub 0. Nearly all of the ultraluminous infrared galaxies show some evidence in their optical spectra for nonthermal nuclear activity. It is proposed that their infrared luminosity is powered by an embedded active nucleus and a nuclear starburst both of which are fueled by the tremendous reservoir of molecular gas. Once these merger nuclei shed their obscuring dust, allowing the AGN to visually dominate the decaying starburst, they become the optically selected quasars.

48635 (N—87-24266, pp vp) **Extragalactic infrared spectroscopy.** Joseph, R.D.; Wright, G.S.; Wade, R.; Graham, J.R.; Gatley, I.; Prestwich, A.H. (United Kingdom Infrared Telescope Unit, Hilo, HI). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The spectra of galaxies in the near infrared atmospheric transmission windows are explored. Emission lines were detected due to molecular hydrogen, atomic hydrogen recombination lines, a line attributed to FEII, and a broad CO absorption feature. Lines due to H_2 and FEII are especially strong in interacting and merging galaxies, but they were also detected in Seyferts and normal spirals. These lines appear to be shock excited. Multi-aperture measurements show that they emanate from regions as large as 15 kpc. It is argued that starbursts provide the most plausible and consistent model for the excitation of these lines, but the changes of relative line intensity of various species with aperture suggest that other excitation mechanisms are also operating in the outer regions of these galaxies.

48636 (N—87-24266, pp vp) **Cloud fluid models of gas dynamics and star formation in galaxies.** Struck-Marcell, C.; Scalo, J.M.; Appleton, P.N. (Texas Univ., Austin). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The large dynamic range of star formation in galaxies, and the apparently complex environmental influences involved in triggering or suppressing star formation, challenges the understanding. The key to this understanding may be the detailed study of simple physical models for the dominant nonlinear interactions in interstellar cloud systems. One such model is described, a generalized Oort model cloud fluid, and two simple applications of it are explored. The first of these is the relaxation of an isolated volume of cloud fluid following a disturbance. Though very idealized, this closed box study suggests a physical mechanism for starbursts, which is based on the approximate commensurability of massive cloud lifetimes and cloud collisional growth times. The second application is to the modeling of colliding ring galaxies. In this case, the driving processes operating on a dynamical timescale interact with the local cloud processes operating on the above timescale. The results is a variety of interesting nonequilibrium behaviors, including spatial variations of star formation that do not depend monotonically on gas density.

48637 (N—87-24266, pp vp) **Starburst-driven superwinds from infrared galaxies.** Heckman, T.M.; Armus, L.; McCarthy, P.; Vanbreugel, W.; Miley, G.K. (Space Telescope Science Institute, Baltimore, MD). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

New data is presented that indicate that strong far infrared galaxies commonly have largescale emission line nebulae whose properties are suggestive of mass outflows (superwinds), presumably driven by the high supernova rate associated with the central starburst. These data include longslit spectra of M82 which show that the radial variation of the gas pressure in the emission line nebula is in excellent agreement with a previous wind model. The M82 nebula also has a LINER spectrum, consistent with shock heating. Morphologically and spectroscopically similar emission line nebulae were found in NGC253, and Arp 220 and NGC6240. A longslit spectroscopic investigation was conducted of 20 additional very powerful far-infrared galaxies and found that they generally have spatially extended emission line nebulae whose spectra closely resemble that of the M82 nebula. If the superwind interpretation is correct, it could have many important consequences in extragalactic astronomy.

48638 (N—87-24266, pp vp) **Interferometric CO observations of the ultraluminous IRAS galaxies ARP 220, IC 694/NGC 3690, NGC 6420 and NGC 7469.** Sargent, A.I.; Sanders, D.B.; Scoville, N.Z.; Soifer, B.T. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

High resolution CO observations of the IRAS galaxies Arp 220, IC 694/NGC 3690, NGC 6240 and NGC 7469 were made with the Millimeter Wave Interferometer of the Owen Valley Radio Observatory. These yield spatial information on scales of 1 to 5 kpc and allow the separation of compact condensations from the more extended emission in the galaxies. In the case of the obviously interacting system IC 694/NGC 3690 the contributions of each component can be discerned. For that galaxy, and also for Arp 220, the unusually high lumonisities may be produced by nonthermal processes rather than by intense bursts of star formation.

48639 (N—87-24266, pp vp) **Initial mass function in HII galaxies.** Campbell, A.W. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Observation of a large sample of HII galaxies shows that the emission line ratios of the youngest objects change systematically with gaseous oxygen abundance, which was interpreted as resulting from changes in the initial mass function (IMF) of the ionizing cluster. Comparison with cluster/nebula models shows that both the slope and the upper mass limit of the cluster IMF vary with abundance. In HII galaxies with oxygen abundance about 1/10 that of Orion, the IMF for massive stars must have a slope which is about a factor of 2 smaller than in the Solar Neighborhood.

48640 (N—87-24266, pp vp) **VLA continuum observations of barred spiral galaxies.** Garcia-Barreto, J.A.; Pismis, P. (Universidad Nacional Autonoma de Mexico, Mexico City). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Observations of NGC 613, NGC 1300, NGC 4314 and NGC 5383 using the VLA at frequencies of 1464.9 and 4885.1 MHz are reported. These objects are a subset of galaxies from which radio emission were searched. The selection criteria were: (1) they are barred spiral galaxies preferentially with different Hubble type; (2) they have a peculiar or hot spot nucleus; (3) they have been observed at far infrared wavelengths by IRAS; and (4) they are observable from the northern hemisphere. Their radio and far infrared properties are summarized and their composite spectra are shown.

48641 (N—87-24266, pp vp) **Dust scattered halo in starburst galaxy M82?.** Rohan, M.; Morrison, P.; Sadun, A. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The source of the halo about M82 has been under discussion for several years. One explanation for it is the dust model of Solinger, Morrison and Markert in which they propose a diffuse cloud of dust through the M81 group, with M82 traveling through the group holding a denser cloud of dust around it. The feasibility of the dust theory is examined in the x-ray range, using the halo in the x-ray image of M82 taken by the Einstein Observatory. To this end the x-ray cross section for dust is presented, along with the single scattered image of an x-ray source surrounded by a dust cloud; multiply scattered images were simulated with a Monte Carlo program; profiles of the halo along the major and minor axes of M82 are presented. Also presented is an accounting for line spectrographs of M82 that show unusual splitting, using the dust model. The final model proposed for the X-ray image requires dust of radius 50 to 300 A, with density on the order of 10 to the -7th power cu cm, out to a distance of about 9 kpc for some regions.

48642 (N—87-24266, pp vp) **Azimuthal and radial distributions of HI and H2 in NGC 6946.** Tacconi-Garman, L.J.; Young, J.S. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A study was completed of the atomic and molecular components of the ISM in NGC 6946. The distribution of molecular clouds was determined from a fully sampled CO map of the inner disk using the 14-meter telescope of the FCRAO. The distribution of atomic gas was derived from VLA observations at 40" resolution in the D configuration. When comparing the global CO and HI properties with other components of the galaxy, it was found that the azimuthally averaged radial distributions of CO, H-alpha, radio continuum and blue light all exhibit similar roughly exponential falloffs, while the azimuthally averaged HI surface densities vary by only a factor of 2 out to R = 16 kpc. This indicates that while the H-alpha/CO ratio is approximately constant with radius, the CO/HI ratio decreases by a factor of 30 from the center of the galaxy to R = 10 kpc.

48643 (N—87-24266, pp vp) **Infrared morphology of galactic centers.** Telesco, C.M.; Decher, R.; Ramsey, B.D.; Wolstencroft, R.D.; Leggett, S.G. (Royal Observatory, Edinburgh, Scotland). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Initial results are presented of a program to map the centers of galaxies in the mid-infrared using the NASA-MSFC 20 pixel bolometer array. Maps at 10.8 micrometer of the galaxies NGC 5236 (M82), NGC 1808, NGC 4536, and NGC 4527 reveal complex emitting regions ranging in size from 500 pc to 2 kpc. The infrared spatial distributions generally resemble those in the visible and radio. In all cases a large fraction of the IRAS 12 micrometer flux originates in spatial structures prominent in the maps.

48644 (N—87-24266, pp vp) **Far-infrared activity and starburst galaxies.** Belfort, P.; Mochkovitch, R.; Dennefeld, M. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

After the IRAS discovery of galaxies with large far-infrared to blue luminosity ratio, it has been proposed that an enhanced star formation could be the origin of the far-infrared emission through dust heating. Whether a simple photometric model is able to account for the FIR and optical properties of IRAS galaxies was investigated. The L sub IR/L sub B ratio, (B-V) color and H sub alpha equivalent width of normal spirals are well reproduced with smooth star formation histories. In the case of starburst galaxies, several theoretical diagrams allow us to estimate the burst strength and extinction. L sub IR/L sub B ratio up to 100 can be rather

easily reached, whereas extreme values probably require IMF truncated at the low end.

48645 (N—87-24266, pp vp) **IRAS observations of starburst galaxies.** Sekiguchi, K. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Far infrared properties of Starburst galaxies were analyzed using IRAS observations at 25, 60, and 100 micrometers. Seventy-nine of 102 Starburst galaxies from the list of Balzano were detected. These galaxies have high IR luminosities of up to a few 10 to the 12th power L sub 0 and concentrate in a small area of the IR color - color diagram. The IR power law spectral indices, alpha, lie within the ranges -2.5 <alpha(60,25)< -1.5 and -1.5 <alpha(100,60)< 0. These observed indices can be interpreted in terms of a cold disk component and a warm component. More than 80% of the 60 micrometer emission comes from the warm component. The fraction of the 60 micrometer emission attributable to the warm component can be used as an activity indicator.

48646 (N—87-24266, pp vp) **Near-infrared study of the luminous merging galaxies NGC 2623 and ARP 148.** Joy, M.; Harvey, P.M. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

As part of an investigation of the physical mechanisms which produce large infrared luminosities in interacting systems, multicolor near-infrared maps were obtained of the long tailed galaxy NGC 2623 and the ring galaxy Arp 148. The near-infrared broadband spectrum was decomposed to obtain the contribution of four processes: emission from evolved stars, nebular continuum emission, thermal reradiation, and extinction. This multicolor analysis, along with 2 micrometer maps and 10 micrometer measurements, is used to determine the structure of these interacting galaxies and to delineate regions of star formation.

48647 (N—87-24266, pp vp) **Star formation in the merging Galaxy NGC3256.** Graham, J.R.; Wright, G.S.; Joseph, R.D.; Frogel, J.A.; Phillips, M.M.; Meikle, W.P.S. (Iowa State Univ. of Science and Technology, Ames). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The central 5 kpc of the ultra-luminous merging galaxy NGC 3256 was mapped at J, H, K, L, and 10 micrometer, and a 2 micrometer spectra of the nuclear region was obtained. This data was used to identify and characterize the super starburst which has apparently been triggered and fueled by the merger of two gas rich galaxies. It is also shown that the old stellar population has relaxed into a single spheroidal system, and that a supernova driven wind might eventually drive any remaining gas from the system to leave a relic which will be indistinguishable from an elliptical galaxy.

48648 (N—87-24266, pp vp) **Luminosity function of the brightest galaxies in the IRAS survey.** Soifer, B.T.; Sanders, D.B.; Madore, B.F.; Neugebauer, G.; Persson, C.J.; Persson, S.E.; Rice, W.L. (Mount Wilson Observatory, Pasadena, CA). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Results from a study of the far infrared properties of the brightest galaxies in the IRAS survey are described. There is a correlation between the infrared luminosity and the infrared to optical luminosity ratio and between the infrared luminosity and the far infrared color temperature in these galaxies. The infrared bright galaxies represent a significant component of extragalactic objects in the local universe, being comparable in space density to the Seyferts, optically identified starburst galaxies, and more numerous than quasars at the same bolometric luminosity. The far infrared luminosity in the local universe is approximately 25% of the starlight output in the same volume.

48649 (N—87-24266, pp vp) **VLA observations of a sample of galaxies with high far-infrared luminosities.** Eagles, S.A.; Wynn-Williams, C.G.; Beichman, C.A. (California Institute of Technology, Pasadena). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Preliminary results are presented from a radio survey of galaxies detected by the IRAS minisurvey. It was found that the main difference between galaxies selected in the far infrared and those selected in the optical is that the former have higher radio luminosities and that the radio emission is more centrally concentrated. There is some evidence that the strong central radio sources in the galaxies selected in the infrared are due to star formation, the star formation rate divided by the volume in which the star formation is occuring is 100 to 1000 times greater in the galaxies selected in the infrared than in the disks of normal galaxies.

48650 (N—87-24266, pp vp) **Systematic identification of IRAS point sources.** Savage, A.; Clowes, R.G.; Macgillivray, H.T.; Wolstencroft, R.D.; Leggett, S.K.; Puxley, P.J. (Edinburgh Univ., Scotland). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A large scale program was initiated to identify IRAS point sources. At ROE the ideal facilities are at hand to undertake such a large program, viz. the rapid scanning capabilities of the COSMOS measuring machine to exploit the depth and resolution of the U.K. Schmidt Telescope J survey plates. Sources in 44 Schmidt plate areas were identified including 1300 sources and covering 1100 square degrees. The identification comprise 700 galaxy identifications and 600 stellar identifications. There are also about 40 sources with no obvious identification but which can be most easily explained by cirrus, confusion between two sources or sources just outside the 2 sigma error box. A major aim with the galaxy identification is to provide a data base from which sound statistical analyses can be made. Accurate blue magnitudes and morphological classifications for each identification were produced.

48651 (N—87-24266, pp vp) **Very deep IRAS survey at l(II) = 97 deg, b(II) = +30 deg.** Hacking, P.; Houck, J.R. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A deep far-infrared survey is presented using over 1000 scans made of a 4 to 6 sq. deg. field at the north ecliptic pole by the IRAS. Point sources from this survey are up to 100 times fainter than the IRAS point source catalog at 12 and 25 micrometers, and up to 10 times fainter at 60 and 100 micrometers. The 12 and 25 micrometer maps are instrumental noise-limited, and the 60 and 100 micrometer maps are confusion noise-limited. The majority of the 12 micrometer point sources are stars within the Milky Way. The 25 micrometer sources are composed almost equally of stars and galaxies. About 80% of the 60 micrometer sources correspond to galaxies on Palomar Observatory Sky Survey (POSS) enlargements. The remaining 20% are probably galaxies below the POSS detection limit. The differential source counts are presented and compared with what is predicted by the Bahcall and Soneira Standard Galaxy Model using the B-V-12 micrometer colors of stars without circumstellar dust shells given by Waters, Cote and Aumann. The 60 micrometer source counts are inconsistent with those predicted for a uniformly distributed, nonevolving universe. The implications are briefly discussed.

48652 (N—87-24266, pp vp) **What are cirrus point sources?.** Heiles, C.; Mccarthy, P.J.; Reach, W.; Strauss, M.A. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Most cirrus point sources are associated with interstellar gas. A subset of these was isolated, together with other sources showing

large band 4 to 3 flux density ratios, that are not associated with interstellar gas. Most of the point sources are associated with diffuse cirrus emissions. The sources appear to be distributed randomly on the sky, with the exception of six clusters, one of which is not associated with any known object. Six sources out of seventeen that were observed for redshifted H I at Arecibo were found to be associated with relatively nondescript external galaxies. Most of the sources do not appear on the Palomar Sky Survey. Deep optical observations of eight fields revealed some fairly distant galaxies, one object with a very peculiar optical spectrum, and several blank fields.

48653 (N—87-24266, pp vp) **Properties of the unusual galaxy PSC 09104+4109.** Kleinmann, S.G.; Keel, W.G. (Leiden Univ., Netherlands). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The IRAS source PSC 09104+4109 is tentatively identified with a faint emission line galaxy having z = 0.442. Assuming this identification is correct, the total infrared luminosity of this galaxy is estimated to be 5 x 10 to the 12th power L sub 0, among the highest for galaxies detected by IRAS. This energy is concentrated at wavelengths less than 30 micrometers, and is approx. 50 times greater than the estimated optical luminosity. The serendipitous way in which this source was found in the PSC catalog suggests that many more similar objects may be found at the lowest levels of the IRAS survey.

48654 (N—87-24266, pp vp) **Redshift survey of IRAS galaxies.** Smith, B.J.; Kleinmann, S.G.; Huchra, J.P.; Low, F.J. (Arizona Univ., Tucson). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Results are presented from a redshift survey of all 72 galaxies detected by IRAS in Band 3 at flux levels equal to or greater then 2 Jy. The luminosity function at the high luminosity end is proportional to L sup -2, however, a flattening was observed at the low luminosity end indicating that a single power law is not a good description of the entire luminosity function. Only three galaxies in the sample have emission line spectra indicative of AGN's, suggesting that, at least in nearby galaxies, unobscured nuclear activity is not a strong contributor to the far infrared flux. Comparisons between the selected IRAS galaxies and an optically complete sample taken from the CfA redshift survey show that they are more narrowly distributed than those optically selected, in the sence that the IRAS sample includes few galaxies of low absolute blue luminosity. It was also found that the space distributions of the two samples differ: the density enhancement or IRAS galaxies is only approx. 1/3 that of the optically selected galaxies in the core of the Coma cluster.

48655 (N—87-24266, pp vp) **Optical and IR luminosity functions of IRAS galaxies.** Vader, J.P.; Simon, M. (State Univ. of New York, Stony Brook). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The optical and infrared luminosity functions are determined for a 60 micron flux-limited sample of 68 IRAS galaxies covering a total area of 150 deg sq. The IR function is in good agreement with that obtained by other authors. The shape of the optical luminosity function is similar to that of optically selected galaxy samples. The integrated light of most objects in the sample have (NII) to H alpha line flux ratios characteristic of HII-region galaxies. In the absolute magnitude range M sub J = -18, -22 about 14% of late-type galaxies are IRAS galaxies. The apparent companionship frequency is about twice as large as that for a comparable sample of non-IRAS late-type galaxies.

48656 (N—87-24266, pp vp) **Correlation between far-IR and radio continuum emission from spiral galaxies.** Dickey, J.M.; Garwood, R.W.; Helou, G. (California Institute of Technology, Pasadena). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A sample of 30 galaxies selected for their intense IRAS flux at 60 and 100 micron using the Arecibo telescope at 21 cm to measure the continuum and HI line luminosities were observed. The centimeter wave continuum correlates very well with the far-infrared flux, with a correlation coefficient as high as that found for other samples, and the same ratio between FIR and radio luminosities. Weaker correlations are seen between the FIR and optical luminosity and between the FIR and radio continuum. There is very little correlation between the FIR and the HI mass deduced from the integral of the 21 cm line. The strength of the radio continuum correlation suggests that there is little contribution to either the radio and FIR from physical processes not affecting both. If they each reflect time integrals of the star formation rate then the time constants must be similar, or the star formation rate must change slowly in these galaxies.

48657 (N—87-24266, pp vp) **Radio and infrared observations of (almost) one hundred non-Seyfert Markarian galaxies.** Dressel, L.L. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The 13 cm flux densities of 96 non-Seyfert Markarian galaxies were measured at Arecibo Observatory. Far infrared flux densities have been published for 78 of these galaxies in the IRAS catalog. The radio, infrared, and optical fluxes of these galaxies and of a magnitude limited sample of normal galaxies were compared to clarify the nature of the radio emission in Markarian galaxies. It was found that Markarian galaxies of a given apparent magnitude and Hubble type generally have radio fluxes several times higher that the fluxes typical of normal galaxies of the same magnitude and type. Remarkably, the ratio of radio flux to far infrared flux is nearly the same for most of these starburst galaxies and for normal spiral disks. However, the compact and peculiar Markarian galaxies consistently have about 60% more radio flux per unit infrared flux than the other Markarian galaxies and the normal spirals. It is not clear whether this difference reflects a difference in the evolution of the starbursts in these galaxies or whether there is excess radio emission of nonstellar origin.

48658 (N—87-24266, pp vp) **Radio-far infrared correlation: Spiral and blue compact dwarf galaxies opposed.** Klein, U.; Wunderlich, E. (Max-Planck-Institute fuer Radioastronomie, Bonn, West Germany). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The recently established correlation between radio continuum and far infrared emission in galaxies was further investigated by comparing normal spiral and blue compact dwarf galaxies. The puzzling result is that the ratio of radio to far infrared luminosity and its dispersion is the same for both samples, although their ratios of blue to far infrared luminosity, their radio spectral indices and their dust temperatures exhibit markedly different mean values and dispersions. This suggests that the amount of energy radiated in the two regimes is enhanced in the same way although the mechanisms responsible for the two components are rather different and complex. The fact that the blue light does not increase at the same proportion shows that both the radio and the far infrared emission are connected with the recent star formation history.

48659 (N—87-24266, pp vp) **Radio continuum, far infrared and star formation.** Wielebinski, R.; Wunderlich, E.; Klein, U.; Hummel, E. (Bonn Univ., West Germany). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A very tight correlation was found between the radio emission and the far infrared emission from galaxies. This has been found for various samples of galaxies and is explained in terms of recent star formation. The tight correlation would imply that the total radio emission is a good tracer of star formation. The correlation between the radio power at 5 GHz and the far infrared luminosity is shown. The galaxies are of various morphological types and were selected from the various IRAS circulars, hence the sample is an infrared selected sample. The far infrared luminosities were corrected for the dust temperature. This is significant because it decreases the dispersion in the correlation.

48660 (N—87-24266, pp vp) **Extragalactic OH megamasers in strong IRAS sources.** Bottinelli, L.; Dennefeld, H.; Gouguenheim, L.; Martin, J.M.; Paturel, G.; Lesqueren, A.M. (Observatoire de Lyon, France). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

From the OH and HI survey of the strongest far infrared IRAS sources, 3 new powerful OH megamasers were discovered in Arp 143, IRAS 1510+0724 and in the uncatalogued IRAS source, IRAS 17208-0014. The HI line, the OH 1667 and 1665 MHz main lines and the 21 cm continuum observations were made with Nancy radio telescope. The optical spectra and images were obtained at the European Southern Observatory. The spectra are displayed in figures together with the main IR and OH properties of the 8 megamasers detected up to now, including IC 4553, NGC 3690 and Mrk 231, Mrk 273 and III ZW35.

48661 (N—87-24266, pp vp) **Near-infrared observations of IRAS minisurvey galaxies.** Carico, D.P.; Soifer, B.T.; Elias, J.H.; Matthews, K.; Neugebauer, G.; Beichman, C.; Persson, C.J.; Persson, S.E. (Mount Wilson Observatory, Pasadena, CA). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Near infrared photometry at J, H, and K was obtained for 82 galaxies from the IRAS minisurvey. The near infrared colors of these galaxies cover a larger range in J-H and H-K than do normal field spiral galaxies, and evidence is presented of a tighter correlation between the near and far infrared emission in far infrared bright galaxies than exists between the far infrared and the visible emission. These results suggest the presence of dust in the far infrared bright galaxies, with hot dust emission contributing to the 2.2 micron emission, and extinction by dust affecting both the near infrared colors and the visible luminosities. In addition, there is some indication that the infrared emission in many of the minisurvey galaxies is coming from a strong nuclear component.

48662 (N—87-24266, pp vp) **Ground-based follow up of IRAS galaxies.** Dennefeld, M.; Karoji, H.; Bouchet, P.; Bottinelli, L.; Gouguenheim, L. (Observatoire de Paris-Meudon, France). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Optical, near infrared, radio continuum and HI observations were undertaken of the galaxies identified with IRAS sources in a few fields roughly of the size of a sky survey plate. Results are presented from two fields at galactic latitude +27 and +43 deg over a total area of 100 sq. deg. These regions contained 115 IRAS point sources, out of which 26 were identified with stars and 81 with faint galaxies, 10 of which were difficult to recognize on the Schmidt plates. Spectroscopy was obtained with the ESO telescopes at a resolution of about 10 A. The vast majority of galaxies have low excitation spectra dominated by low ionization lines. The spectra are typical of HII region type galaxies, however of much lower excitation that other starbursts galaxies. The importance of the reddening as determined from the H alpha/H beta ratio is stressed: the visual absorption A sub v ranges from 2 to 6 magnitudes and as a consequence the corrected L sub IR/L sub B ratios are considerably reduced if those reddenings apply to the whole galaxy.

48663 (N—87-24266, pp vp) **Nuclear infrared emission and the colors of IRAS galaxies.** Hill, G.J. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

J, H, K, L', and N observations of galaxies detected at 12 microns by IRAS are combined with IRAS flux densities to investigate the relationship between the infrared sizes and colors of galaxian infrared sources. It is found that typical IRAS galaxies have 10 micron radii of 0.5 to 2.0 kpc, while active galaxies and galaxies with higher 25 to 60 micron color temperatures are smaller. One unusal object, 23060+0505, is at high redshift and has an infrared luminosity of 1.5 x 10 to the 12th power L sub 0. Its 1 to 100 micron energy distribution resembles that of a Seyfert 1 galaxy, but it shows very little sign of broad line emission in the visible. Its properties suggest that it may be a prototype for a class of highly obscured active galaxy.

48664 (N—87-24266, pp vp) **Enhanced star formation: the importance of bars in spiral galaxies.** Puxley, P.J.; Hawarden, T.G.; Mountain, C.M.; Leggett, S.K. (Royal Observatory, Edinburgh, Scotland). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

It was found that among an IR luminous subset of nearby spiral galaxies, nearly all of the systems with IRAS colors and luminosities indicative of enhanced star formation are barred. Radio continuum and IR spectroscopic results support the hypothesis that this emission originates within the central 2 kpc; possibly in a circumnuclear ring. It was also found that outer rings are over represented among these barred systems and suggest possible reasons for this phenomena.

48665 (N—87-24266, pp vp) **Properties of highly luminous IRAS galaxies.** Wolstencroft, R.D.; Puxley, P.J.; Heasley, J.N.; Leggett, S.K.; Savage, A.; Macgillivray, H.T.; Clowes, R.G. (Edinburgh Univ., Scotland). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

From a complete sample of 154 galaxies identified with IRAS sources in a 304 sq deg area centered on the South Galactic Pole, a subsample of 58 galaxies with L sub IR/L sub B $>$ 3 was chosen. Low resolution spectra were obtained for 30% of the subsample and redshifts and relative emission line intensities were derived. As a class these galaxies are very luminous with $<$ L sub IR $>$ = 2.9 x 10 to the 11th power L sub 0 and (L sub IR) max = 1.3 x 10 to the 12th power L sub 0. CCD images and JHK photometry were obtained for many of the subsample. The galaxies are for the most part newly identified and are optically faint, with a majority showing evidence of a recent interaction. Radio continuum observations of all galaxies of the subsample were recently obtained at 20 cm VLA with about 75% being detected in a typical integration time of about 10 minutes.

48666 (N—87-24266, pp vp) **Relation between star formation and active nuclei.** Rieke, G.H. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Three questions relevant to the relation between an active nucleus and surrounding star formation are discussed. The infrared stellar CO absorption bands can be used to identify galaxies with large populations of young, massive stars and thus can identify strong starburst unambiguously, such as in NGC 6240, and can help identify composite active/starburst systems such as Arp 220. An active nucleus is probably not required for LINER spectral characteristics; dusty starburst galaxies, particularly if they are nearly edge-on, can produce LINER spectra through the shock heating of their interstellar media by supernovae combined with the obscuration of their nuclei in the optical. The Galactic Center would be an

ideal laboratory for studying the interaction of starbursts and active nuclei, if both could be demonstrated to occur there. Failure to detect a cusp in the stellar distribution raises questions about the presence of an active nucleus, which should be answered by additional observations in the near future.

48667 (N—87-24266, pp vp) **Ground-based 1- to 32-microns observations of ARP 220: evidence for a dust-embedded AGN?.** Becklin, E.E.; Wynn-Williams, C.G. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

New observations of the 10 and 20 micron size of the emission region in Arp 220 are presented. Also given are ground based photometry from 1 to 32 micron including measurements of the strength of the silicate feature at 10 micron. The results show that the 20 micron size of Arp is smaller than 1.5 arcsec (500 pc); comparison of IRAS and ground based observations show that IRAS 12 micron flux measured with a large arcmin beam is the same as that seen from the ground with a 3 arcsec aperture. At 10 micron a deep silicate absorption feature is seen that corresponds to a visual extinction of about 50 mag. These results suggest that a very significant portion of the 10 to the 12th power L sub 0 infrared luminosity from Arp 220 comes from a region less than or of the order of 500 pc in diameter. When these results are combined with recent measurement of a broad Brackett alpha line by DePoy and an unresolved 2.2 micron source by Neugebauer, Matthews and Scoville, a very attractive possibility for the primary luminosity source Arp 220 is a dust embedded compact Seyfert type nucleus.

48668 (N—87-24266, pp vp) **Spatial deconvolution of IRAS galaxies at 60 UM.** Low, F.J. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Using IRAS in a slow scan observing mode to increase the spatial sampling rate and a deconvolution analysis to increase the spatial resolution, several bright galaxies were resolved at 60 micron. Preliminary results for M 82, NGC 1068, NGC 3079 and NGC 2623 show partially resolved emission from 10 to 26 arcsec., full width at half maximum, and extended emission from 30 to 90 arcsec. from the center. In addition, the interacting system, Arp 82, along with Mark 231 and Arp 220 were studied using the program ADDSCAN to average all available survey mode observations. The Arp 82 system is well resolved after deconvolution and its brighter component is extended; the two most luminous objects are not resolved with an upper limit of 15 arcsec. for Arp 220.

48669 (N—87-24266, pp vp) **Star formation around active galactic nuclei.** Keel, W.C. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Active galactic nuclei (Seyfert nuclei and their relatives) and intense star formation can both deliver substantial amounts of energy to the vicinity of a galactic nucleus. Many luminous nuclei have energetics dominated by one of these mechanisms, but detailed observations show that some have a mixture. Seeing both phenomena at once raises several interesting questions: (1) Is this a general property of some kinds of nuclei? How many AGNs have surround starbursts, and vice versa? (2) As in 1, how many undiscovered AGNs or starbursts are hidden by a more luminous instance of the other? (3) Does one cause the other, and by what means, or do both reflect common influences such as potential well shape or level of gas flow? (4) Can surrounding star formation tell us anything about the central active nuclei, such as lifetimes, kinetic energy output, or mechanical disturbance of the ISM? These are important points in the understanding of activity and star formation in galactic nuclei. Unfortunately, the observational ways of addressing them are as yet not well formulated. Some preliminary studies are reported, aimed at clarifying the issues involved in study of the relationships between stellar and nonstellar excitement in galactic nuclei.

48670 (N—87-24266, pp vp) **Star formation in Seyfert galaxies.** Espinosa, J.M.R.; Rudy, R.J.; Jones, B. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

An analysis of the IRAS data for a sample of classical (optically selected) Seyfert galaxies is presented. The IRAS fluxes at 25 micron, 60 micron, and 100 micron are found to be uncorrelated or only very weakly correlated with the UV/Optical continuum flux and the near and mid IR flux at 3.5 and 10 microns. To investigate the possibility that star formation accounts for the far IR flux, the IRAS measurements for the Seyfert galaxies are compared to IRAS observations of a sample of normal spiral galaxies, and a sample of Starburst galaxies. It is shown that the far IR luminosities and far IR colors of Seyfert galaxies are indistinguishable from those of the Starburst galaxies. Besides, normal galaxies are an order of magnitude less luminous than both the Seyfert and the Starburst galaxies. This indicates that star formation produces the bulk of the far infrared emission in Seyfert galaxies.

48671 (N—87-24266, pp vp) **Circumnuclear starbursts in Seyfert galaxies.** Wilson, A.S. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Observational diagnostics for the recognition of circumnuclear star formation in Seyfert galaxies are described and illustrated. These methods include: (1) spatially resolved optical spectroscopy, which allows the emission lines for HII regions to be separated from those originating in gas ionized by the Seyfert nucleus; (2) radio continuum mapping, where the linear radio sources characteristic of the nuclear activity may be distinguished from the diffuse morphology of multiple supernova remnants generated in a starburst; (3) infrared spectroscopic searches for emission features of dust, which are seen in starbursts but not in Seyfert nuclei; (4) the shape of the IRAS spectrum. These various diagnostics agree well as to the presence or absence of ongoing star formation. The IRAS spectra of a significant fraction of Seyferts are dominated by emission from dust heated by stars, not the Seyfert nucleus itself. In these cases, the spectrum is curved, being steep between 25 and 60 microns and flatter between 60 and 100 microns. When the Seyfert nucleus dominates, the 25 to 100 micron spectrum is much flatter. It is suggested that the location of a Seyfert galaxy in the IRAS color-color diagram reflects primarily the relative contributions of the active nucleus and dust heated by stars to the infrared fluxes.

48672 (N—87-24266, pp vp) **IRAS observations of AGN candidates at low flux levels.** Degrijp, M.H.K.; Keel, W.C.; Miley, G.K. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

IRAS additional observations were used to obtain a sample of point sources at much fainter flux levels than hitherto available through the IRAS Point Source Catalogue. This sample is being used to compile an incomplete but representative catalogue of faint IRAS candidate Active Galactic Nuclei (AGNs) and to study the evolution of the infrared bright galaxies. Ground based follow up observations (optical spectroscopy) are mainly hampered by identification confusion.

48673 (N—87-24266, pp vp) **Spectrophotometery of Brackett lines in very luminous IRAS galaxies.** Depoy, D.L. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Observation of the Brackett-alpha and Brackett-gamma hydrogen recombination lines were made in a sample of galaxies chosen from the IRAS catalog to have high luminosities at infrared wavelengths. Most have strong Brackett line emission indicating large numbers of high mass stars; the formation of these stars may hence be the underlying source for the galaxies' luminosities. However, there are at least two exceptions that may not be explained in

this manner: NGC 6240 and Arp 220. Additional evidence indicates that each of these exceptions may be more closely related to Seyfert-type galaxies or other active galactic nuclei.

48674 (N—87-24266, pp vp) **Evidence for extended IR emission in NGC2798 and NGC6240.** Wright, G.S.; Joseph, R.D.; James, P.A.; Robertson, N.A. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Extended emission at 10 and 20 microns can be used to distinguish starbursts from monsters as the underlying energy source driving the luminous infrared emission in the central regions of galaxies. The spatial extent of the mid infrared emission in the interacting galaxy NCG 2798 and the merger NGC 6240 were investigated. The 10 and 20 micron profiles of the IR source in NGC 2798 are significantly wider than beam profiles measured on a standard star, supporting a starburst interpretation of its IR luminosity. For NGC 6240 there is marginal evidence for an extended 10 micron source, suggesting that a significant fraction of its IR luminosity could be produced by a burst of star formation.

48675 (N—87-24266, pp vp) **Models relating the radio emission and ionised gas in Seyfert nuclei.** Pedlar, A.; Unger, S.W.; Axon, D.J.; Dyson, J.E. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Possible models are discussed in which the radio emitting components in Seyfert II nuclei can compress and accelerate the ambient nuclear medium to produce the characteristics of the narrow line region. A first order model, which considers only the expansion of the radio components, is briefly described. However, in many Seyfert nuclei it appears that the linear motion of the radio components is also important. This can result in shock heating of the ambient medium, and if the cooling time is long enough, can lead to a displacement between the radio component and the associated emission lines. This effect may be present in NGC 1068 and NGC 5929 and by considering ram pressure balance and the cooling length it is possible to estimate lobe velocities and ambient densities.

48676 (N—87-24266, pp vp) **Structure in the nucleus of NGC 1068 at 10 microns.** Tresch-Fienberg, R.; Fazio, G.G.; Gezari, D.Y.; Hoffmann, W.F.; Lamb, G.M.; Shu, P.K.; Mccreight, C.R. (National Aeronautics and Space Administration, Ames Research Center, Moffett Field, CA). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

New 8 to 13 micron array camera images of the central kiloparsec of Seyfert 2 galaxy NGC 1068 resolve structure that is similar to that observed at visible and radio wavelengths. The images reveal an infrared source which is extended and asymmetric, with its long axis oriented at P.A. 33 deg. Maps of the spatial distribution of 8 to 13 micron color temperature and warm dust opacity are derived from the multiwavelength infrared images. The results suggest that there exist two pointlike luminosity sources in the central regions of NGC 1068, with the brighter source at the nucleus and the fainter one some 100 pc to the northeast. This geometry strengthens the possibility that the 10 micron emission observed from grains in the nucleus is powered by a nonthermal source. In the context of earlier visible and radio studies, these results considerably strengthen the case for jet induced star formation in NGC 1068.

48677 (N—87-24266, pp vp) **Far-infrared properties of optically-selected quasars and Seyfert galaxies.** Edelson, R.A.; Malkan, M.A. (California Univ., Los Angeles). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Pointed IRAS observations and ground based observations are used to determine the infrared properties of optically selected galaxies and quasars. The use of complete, unbiased, optically selected samples means that statistical tests can be applied to probe the underlying properties of active galactic nuclei (AGNs). The near infrared to millimeter spectral energy distributions (SEDs) were studied of the CfA Seyfert galaxies, a well defined, unbiased sample of 25 Type 1 and 23 Type 2 Seyfert galaxies selected by optical spectroscopy. Data given show strong trends in the infrared SEDs. Strong evidence is also given that the infrared spectra of Seyfert 2 galaxies are dominated by thermal emission from warm dust, while nonthermal emission is more important in the spectra of quasars and luminous Seyfert 1 nuclei.

48678 (N—87-24266, pp vp) **Infrared-ultraviolet spectra of active galactic nuclei.** Malkan, M.A.; Edelson, R.A. (Owens Valley Radio Observatory, Pasadena, CA). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

Data from IRAS and IUE were combined with ground based optical and infrared spectrophotometry to derive emission line free spectral energy distributions (SEDs) for 29 active galactic nuclei (AGNs) between 0.1 and 100 microns. The IRAS data were scaled down to account for extended emission. These correction factors, determined by comparing small aperture ground based 10.6 micron data with large aperture IRAS 12 micron fluxes, were usually less than 25%. These corrected SEDs are shown.

48679 (N—87-24266, pp vp) **IRAS observations of BL Lac objects.** Impey, C.; Neugebauer, G.; Miley, G. (Space Telescope Science Institute, Baltimore, MD). May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

IRAS data was analyzed for 35 BL Lac objects selected from a complete 5 GHz radio sample, using the coadded survey database. The detection rate is 50% with more than 40% detected in more than one band. This compares with only 15% of these sources that are included in the IRAS Point Source Catalog. High luminosity BL Lac objects generally have smooth energy spectra over four or five decades in frequency, consistent with incoherent synchrotron emission from 1 cm to 1 micron. However, many low luminosity BL Lac objects have discontinuous spectra, with a large range in the spectral index at IRAS wavelengths. For BL Lacs with a total luminosity of less than 10 to the 44th power ergs/-s, most of the far infrared energy probably originates from dust heated near the galaxy nucleus. The energy budget shows that the majority of the power per unit bandwidth emerges in the infrared (1 to 100 microns).

48680 (N—87-24266, pp vp) **Spectral classification of emission-line galaxies.** Veilleux, S.; Osterbrock, D.E. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

A revised method of classification of narrow line active galaxies and H II region-like galaxies is proposed. It involves the line ratios (O III) lambda 5007/H beta, (N II) lambda 6583/H alpha, (S II) (lambda lambda 6716 = 6731)/H alpha, and (O I) lambda 6300/H alpha. These line ratios take full advantage of the physical distinction between the two types of objects and minimize the effects of reddening correction and errors in the flux calibration. Large sets of internally consistent data are used including new previously unpublished measurements. Prediction of recent photoionization models by power law spectra and by hot stars are compared with the observations. The classification is based on the observational data interpreted on the basis of these models.

48681 (N—87-24266, pp vp) **Summary of symposium: low luminosity sources.** Shu, F.H. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The author summarized certain aspects of the conference. He shares this task with another colleague thereby breaking the task into more manageable proportions. The author covers the low luminosity sources. He begins his review with a summary of some major themes of the conference and ends with a few speculations on possible theoretical mechanisms.

48682 (N—87-24266, pp vp) **Morphology of luminous IRAS galaxies: summary talk.** Becklin, E.E. May 1987. NTIS, PC A99/MF E03. (NASA-CP—2466; NAS—1.55:2466; CONF-8606337—).

From Star formation in galaxies; Pasadena, CA, USA (16 Jun 1986).

The author discusses the morphology of luminous Infrared Astronomy Satellite (IRAS) galaxies. A few comments are made about the direction to be taken in future observations of luminous IRAS galaxies.

48683 **(PB—87-204939/XAB) Solar-Geophysical Data Number 513, May 1987. Part 1 (prompt reports). Data for April, March 1987 and late data.** Coffey, H.E.; McKinnon, J.A. (National Geophysical Data Center, Boulder, CO (USA)). May 1987. 98p. (SGD—513-PT-1). NTIS, PC A05/MF A01.

See also Part 2, PB—87-204947, and PB—87-195251.

Contents include: Detailed index for 1986-1987; Data for April 1987 (IUWDS alert periods, Solar activity indices, Solar flares, Solar radio emission, Stanford mean solar magnetic field); Data for March 1987 (Solar active regions, Sudden ionospheric disturbances, Solar radio spectral observations, Cosmic-ray measurements by neutron monitor, Geomagnetic indices, Radio propagation indices); Late data (Cosmic-ray measurements by neutron monitor Thule January-February 1987, Geomagnetic indices February 1987).

48684 **(PB—87-204947/XAB) Solar-Geophysical Data Number 513, May 1987. Part 2. (comprehensive reports). Data for November 1986, and miscellanea.** Coffey, H.E. (National Geophysical Data Center, Boulder, CO (USA)). May 1987. 31p. (SGD—513-PT-2). NTIS, PC A03/MF A01.

See also Part 1, PB—87-204939 and PB—87-195269.

Contents include: Detailed index for 1986-1987; Data for November 1986 Meudon carte synoptique, Solar flares, Solar radio bursts at fixed frequencies, Solar x-ray radiation from GOES satellite, and Active prominences and filaments.

48685 **(RRK—86-41) On some propagators of a scalar wave in a (n+1)-dimensional spacetime.** Nariai, Hidekazu. (Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics). Oct 1986. 7p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703041.

This is a sequel to the previous paper in 1978, which dealt with propagators for a quantized scalar field in some isotropic universe. In so doing, I have used the geodesic bi-scalar $\sigma(x,x')$ obtained in our recent paper RRK 86 - 37. Our result will be useful in the dimensional regularization of a quantized scalar field in any curved spacetime of the same type.

48686 **(RRK—86-43) Number count-redshift relation in universe models with nonzero cosmological constant.** Tomita, Kenji. (Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics). Oct 1986. 12p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703043.

The selection of universe models has so far been performed by comparing mainly the theoretical redshift - magnitude relation with the observational data (Sandage 1961, Baum 1962, Tomita and Hayashi 1963 and Solheim 1966), but the evolutionary changes in the absolute luminosity of sources have made their unambiguous selection difficult. Loh and Spillar's (1986a, b) recent photometric data on the number count of galaxies and their redshifts are very appropriate to their selection, because the evolution of galaxies have little influence on the number count - redshift relation. In this Letter we shall extend Loh and Spillar's (1986b) analysis in the case of the cosmological constant $\Lambda = 0$ to the case of Λ not $= 0$ and show whether the Lemaitre models can be consistent with their data or not.

48687 **(UCRL—95525) Adiabatic supernova expansion into the circumstellar medium.** Band, D.L.; Liang, E.P. (Lawrence Livermore National Lab., CA (USA)). 8 Jun 1987. Contract W-7405-ENG-48. 7p. (CONF-8706201—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014241.

From 101. International Astronomics Union colloquium on interaction of supernova remnants with the interstellar medium; Penticon, Canada (8 Jun 1987).

We perform one dimensional numerical simulations with a Lagrangian hydrodynamics code of the adiabatic expansion of a supernova into the surrounding medium. The early expansion follows Chevalier's analytic self-similar solution until the reverse shock reaches the ejecta core. We follow the expansion as it evolves towards the adiabatic blast wave phase. Some memory of the earlier phases of expansion is retained in the interior even when the outer regions expand as a blast wave. We find the results are sensitive to the initial configuration of the ejecta and to the placement of grid-points. 6 refs., 2 figs.

48688 **Cometary cloud in the solar system and the Resibois—Prigogine singular invariants of motion.** Petrosky, T.Y. (Center for Studies in Statistical Mechanics, University of Texas at Austin, Austin, Texas 78712). *Journal of Statistical Physics;* **48**: No. 3, 1363-1372(Sep 1987).

A relation between nonintegrability of nonlinear dynamical systems with a continuous Fourier spectrum and irreversibility is investigated in terms of the Lie-algebraic formalism. Resibois and Prigogine's singular invariants of motion play an essential role. As an application of the formalism, we solve the restricted three-body problem for the case of nearly parabolic motion of the third body. This gives a model of the motion of a comet in the solar system. The results indicate that there is (deterministic) chaos in the motion of a comet in a nearly parabolic orbit. A possible physical implication of the chaotic motion is the existence of a cometary cloud surrounding the solar system. The theoretical results are compared with numerical results, and show good agreement.

48689 **Second catalog of gamma-ray bursts - 1978-1980 localizations from the interplanetary network.** Atteia, J.L.; Barat, C.; Hurley, K.; Niel, M.; Vedrenne, G.; Evans, W.D.; Fenimore, E.E.; Cline, T.; Desai, U.; Teegarden, B. (Centre d'Etude Spatiale des Rayonnements, Toulouse, France; Los Alamos National Lab., NM; NASA, Goddard Space Flight Center, Greenbelt, MD). *Astrophysical Journal, Supplement Series;* **64**: 305-317(May 1987).

A catalog of 84 gamma-ray bursts which occurred between September 14, 1978 and February 13, 1980 is presented. The data presented consist of earth crossing times, given to about the nearest second, and time histories, in the tens of keV to MeV range, for all 84 events, as well as localizations for 80 of the events. The localizations, derived from arrival-time analysis, are given as single error boxes, double error boxes, or annuli of location, and, where possible, have been compared to the Konus localizations. They range in size from less than a square arcminute to over 1000 square degrees. The fluences of the bursts cataloged are in the range 3 x 10 to the -7th ergs/sq cm and above. 32 references.

6402 Atmospheric Physics

REFER ALSO TO CITATION(S) 48263, 48683

48690 **(AD-A—182190/9/XAB) Quadrennial review of the magnetotail.** Huang, C.Y. (Iowa Univ., Iowa City (USA). Dept. of Physics and Astronomy). Apr 1987. 14p. NTIS, PC A02/MF A01.

Pub. in Reviews of Geophysics, Vol. 25, No. 3, 529-540(Apr 1987).

There has been a great deal of interest in the magnetotail during the past quadrennial period. This has been in part due to the passage of ISEE 3 through the distant magnetotail. The investigation of the region from 60 to 220 RE from the earth has contribut-

ed much to our understanding of tail structure and dynamical response to geomagnetic activity. As always the question of substorms and the nature of energy transfer is a focus for many publications. At the same time the region earthward of 35 RE was thoroughly investigated, using observations gained by the ISEE 1 and 2, and IMP 8 spacecraft. Case studies of selected events and statistical analyses were carried out. Multi-spacecraft correlations using low altitude or geosynchronous satellite data, simultaneously sampled with magnetotail observations, attempt to separate temporal from spatial variations, and thus provide a global description of the energy-transfer process. In this respect the global imaging provided by the Dynamics Explorer 1 satellite will doubtless be a powerful tool in future studies. Currently, a workshop (CDAW 8) utilizing imaging, solar wind, and tail observations is being planned.

48691 **(AD-A—182292/3/XAB) Determination of ionospheric electron-density profiles from satellite uv (ultraviolet) emission measurements.** Decker, D.T.; Daniell, R.E.; Jasperse, J.R.; Strickland, D.J. (Air Force Geophysics Lab., Hanscom AFB, MA (USA)). 1986. 9p. (AFGL-TR—87-0187). NTIS, PC A02/MF A01.

Pub. in SPIE, Ultraviolet Technology, Vol. 687, 73-80(1986).

This paper addresses the problem of using satellite ultraviolet measurements to deduce the ionospheric electron density profile (EDP). The ionospheric processes that produce the ultraviolet emissions differ from region to region, so it is necessary to consider separate approaches for the various ionospheric subregions. The authors discuss approaches suitable for (1) the midlatitude daytime ionosphere, (2) the midlatitude nighttime ionosphere, and (3) the undisturbed auroral E layer.

48692 (INIS-SU—418, pp 61-63) **On a daily variation of cosmic ray flux in the stratosphere.** Asatryan, G.A.; Babayan, V.Kh.; Krajnev, M.B.; Stozhkov, Yu.I. (Erevanskij Fizicheskij Inst., USSR). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

In Plasma physics. Collection.

Experimental data on measurements a daily variation of cosmic rays (CR) in the statosphere in different period are presented. Different mechanism of formation of a strong (— 4%) observed variation are discussed. Strong daily variations of CR intensity in the stratosphere couldn't be referred to the known mechanisms of daily variations (temperature effect, CR anizotropy effect). Probably, daily variation cause is existence of hypothetic pulsations of CR intensity in the stratosphere with a period of 160 min, typical of variations of many important for CR the Sun and magnetic field characteristics. 8 refs.; 2 figs.

48693 (N—87-24247, pp vp) **Auroral particles.** Evans, D.S. Jun 1987. NTIS, PC A18/MF A01. (NASA-CP—2464; REPT—87B0055; NAS—1.55:2464; CONF-8504313—).

From Essays in space science; Greenbelt, MD, USA (23 Apr 1985).

The problems concerning the aurora posed prior to the war are now either solved in principle or were restated in a more fundamental form. The pre-war hypothesis concerning the nature of the auroral particles and their energies was fully confirmed, with the exception that helium and oxygen ions were identified as participating in the auroral particle precipitation in addition to the protons. The nature of the near-Earth energization processes affecting auroral particles was clarified. Charged particle trajectories in various electric field geometries were modeled. The physical problems have now moved from determining the nature and geometry of the electric fields, which accelerate charged particles near the Earth, to accounting for the existence of these electric fields as a natural consequence of the solar wind's interaction with Earth. Ultimately the reward in continuing the work in auroral and magnetospheric particle dynamics will be a deeper understanding of the subtleties of classical electricity and magnetism as applied to situations not blessed with well-defined and invariant geometries.

48694 **(OUP—87-12) Electrodynamics of the polar cusp ionosphere. A case study.** Sandholt, P.E.; Lybekk, B.; Egeland, A.; Bythrow, P.F.; Hardy, D.A. (Oslo Univ. (Norway). Fysisk Inst.). Apr 1987. 32p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752520.

Satellite measurements of magnetic field and ion drift components above auroral structures observed from the ground permits detailed investigations of auroral electrodynamics in the cusp ionosphere. Information on Birkeland currents, Poynting flux, height-integrated Pedersen conductivity and Joule heat dissipation rate has been derived. Intermediate scale (10's of km) structures of enhanced electron precipitation with peak energy fluxes — 5 ergs/cm/sup 2/ sec (5.10/sup -3/ W/m/sup 2/) and average energy — 0.1 keV were associated with strong, red-dominated auroral forms (I 630.0 nm≅ 5 kR) with typical spectral ratio I 630.0/nm/I557.7 nm ≅ 5. Within these forms strong northward electric fields with peak values of — 200 mV/m and Birkeland current densities — 10 μA/m/sup 2/ were observed. Rather complex patterns of Birkeland currents were connected to these structures. Both downward and upward directed Poynting fluxes associated with the Birkeland currents were inferred, at different latitudes within the cusp. The downward flux is dissipated as ionospheric Joule heating. Indications of additional dissipation and/or source mechanisms associated with the Poynting flux are observed in some limited regions. From correlated latitudinal variations in electric and magnetic field components, the Joule heat dissipation rate wihtin one of the auroral forms could be estimated. The dissipation rate in the center of this structure was found to be — 5 times higher than the particle energy input rate. The satellite pass occurred within an interval (IMF B/sub z/ < 0) characterized by a series of short-lived (few minutes) poleward moving auroral structures, each appearing at the cusp equatorward boundary. 21 refs.

48695 **(PB—87-203998/XAB) TIROS-N/NOAA A-J space environment monitor subsystem. Technical memo.** Seale, R.A.; Bushnell, R.H. (National Oceanic and Atmospheric Administration, Boulder, CO (USA). Space Environment Lab.). Apr 1987. 117p. (NOAA-TM-ERL-SEL—75). NTIS, PC A06/MF A01.

The Space Environment Monitor (SEM), which is incorporated as a subsystem in the TIROS-N and NOAA A-J satellites, is described. The SEM consists of a Total Energy Detector (TED), a Medium Energy Proton and Electron Detector (MEPED), a High Energy Proton and Alpha Detector (HEPAD) and a Data Processing Unit (DPU). The detectors are intended to provide near-real-time particle data for use in the Space Environment Service Center of National Oceanic and Atmospheric Administration (NOAA) and to provide a long-term scientific data base. Telemeter codes, data reduction, and test instructions are given.

48696 **(PB—87-208666/XAB) Space Environment Laboratory annual report - FY 1986, October 1, 1985 to September 30, 1986.** (National Oceanic and Atmospheric Administration, Boulder, CO (USA). Space Environment Lab.). 1986. 58p. NTIS, PC A04/MF A01.

See also PB—86-218567.

Contents include: Space environment services (Space Environment Services Center, Space Environment Data Collection); Research and development (Magnetospheric physics, Atmospheric-ionospheric-magnetospheric interactions, Interplanetary physics, Solar physics project, Solar x-ray physics, Space environment data systems development, Technique development).

6403 Atomic, Molecular, And Chemical Physics

REFER ALSO TO CITATION(S) 47921, 47996, 48116, 48222, 48900, 48900, 49001, 49030, 49095, 49125

48697 **(AD-A—181911/9/XAB) Reduced-mass Fock-Tani representations for $a^+V(b^+c^-) = (a^+c^-)+b^+$ and first-order results for (abc)=(ppe, epe, μpμ, μdμ, and μtμ). Technical report.** Straton, J.C. (Oregon Univ., Eugene (USA)). 1 May 1987. 17p. (QFT—14). NTIS, PC A02/MF A01.

Pub. in Physical Review A, Vol. 35, No. 9, 3725-3740(1 May 1987).

The Fock-Tani representation is adapted to use of Jacobi coordinates useful in theory of 3-body charge transfer. This representation is applied to calculation of charge transfer cross sections for collisions involving several types of ions and 2-body bound states.

48698 **(AD-A—182302/0/XAB) Ion-dipolar molecule rate coefficients.** Morgan, W.L.; Bates, D.R. (Queen's Univ., Belfast, Northern Ireland (UK). Dept. of Applied Mathematics and Theoretical Physics). 15 Mar 1987. 6p. NTIS, PC A02/MF A01.

Pub. in Astrophysical Jnl., Vol. 314, 817-821(15 Mar 1987).

Using the semiclassical adiabatic invariance method, extensive computations are performed on the cross sections and rate coefficients for hitting collisions between ions and linear polar molecules. The results are parameterized so that the cross sections and rate coefficients for any polarizability, dipole moment, reduced mass, and temperature can easily be calculated. Some computations are also performed for collisions involving symmetrical top polar molecules in low (J, K) levels. The results show that the (1,1) rate coefficients are rather greater than are the (1,0) rate coefficients (which are as for a linear polar molecule), especially at low temperatures.

48699 **(AD-A—182457/2/XAB) Excitations during collisionally-induced electron detachment of negative ions. Final report, 1 August 1983-31 December 1986.** Menendez, M.G. (Georgia Univ., Athens (USA). Dept. of Physics). Jun 1987. 20p. NTIS, PC A02/MF A01.

This research has had its main thrust the detailed investigation of the electron-loss processes of H^- in collisions with neutral atoms (mainly He) and some measurements associated with projectile excitation in ion-atom collisions. Measurements were made on the energy spectrum of detached electrons at a laboratory scattering angle of zero in coincidence with Lyman-alpha photons from the excitation and subsequent decay of H(2p) produced during the process, H- + He becoming H(2p) + e- + He*, at 0.5-MeV incident ion energy. It was found that this electron energy distribution mimics the so-called very sharp peak feature of the doubly differential cross section previously measured under e- and H coincidence conditions. This result shows that excitation of H is responsible for the very sharp peak and that the detached electron energy distribution associated with H(2p) is significantly different from the distribution associated with the production of H(1s).

48700 **(AD-A—182638/7/XAB) Theory of half-collision cross sections.** Girardeau, M.D. (Oregon Univ., Eugene (USA)). 1986. 11p. (QFT—15). NTIS, PC A02/MF A01.

Pub. in International Jnl. of Quantum Chemistry, Vol. 29, 1483-1492(1986).

The Lippman-Schwinger quantum theory of collisions is generalized so as to become applicable to decay of metastable states, and used to derive a general formula for the decay cross section.

48701 **(ANL-PHY—87-1) Proceedings of the workshop on opportunities for atomic physics using slow, highly-charged ions.** (Argonne National Lab., IL (USA)). 1987. Contract W-31109-ENG-38. 298p. (CONF-870152—). NTIS, PC A13/MF A01; 1; GPO Dep. File Number DE87013991.

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

The study of atomic physics with highly-charged ions is an area of intense activity at the present time because of a convergence of theoretical interest and advances in experimental techniques. The purpose of the Argonne "Workshop on Opportunities for Atomic Physics Using Slow, Highly-Charged Ions" was to bring together atomic, nuclear, and accelerator physicists in order to identify what new facilities would be most useful for the atomic physics community. The program included discussion of existing once-through machines, advanced ion sources, recoil ion techniques, ion traps, and cooler rings. One of the topics of the Workshop was to discuss possible improvement to the ANL Tandem-Linac facility (ATLAS) to enhance the capability for slowing down ions after they are stripped to a high-charge state (the Accel/Decel technique). Another topic was the opportunity for atomic physics provided by the ECR ion source which is being built for the Uranium Upgrade of ATLAS. 18 analytics were prepared for the individual papers in this volume.

48702 (ANL-PHY—87-1, pp 1-15) **Status of QED [Quantum Electrodynamics] in atomic physics.** Sapirstein, J. (Univ. of Notre Dame, IN). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

This paper presents a discussion of QED. QED effects, as applied to atomic physics, are defined. The hyperfine splitting of muonium is discussed. Lamb shifts in hydrogen and large Z one-electron atoms are also explored. Many-body effects that can be investigated in two and three or more electron systems are discussed. (JDH)

48703 (ANL-PHY—87-1, pp 17-36) **Accurate x-ray spectroscopy.** Deslattes, R.D. (National Bureau of Standards, Gaithersburg, MD). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

Heavy ion accelerators are the most flexible and readily accessible sources of highly charged ions. These having only one or two remaining electrons have spectra whose accurate measurement is of considerable theoretical significance. Certain features of ion production by accelerators tend to limit the accuracy which can be realized in measurement of these spectra. This report aims to provide background about spectroscopic limitations and discuss how accelerator operations may be selected to permit attaining intrinsically limited data.

48704 (ANL-PHY—87-1, pp 37-47) **Spectroscopy of highly ionized atoms.** Livingston, A.E. (Notre Dame Univ., IN). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

The atomic structure and decay characteristics of excited states in multiply ionized atoms represent a fertile testing ground for atomic calculations ranging from accurate ab initio theory for few-electron systems to practical semi-empirical approaches for many-electron species. Excitation of fast ions by thin foils generally produces the highest ionization stages for heavy ions in laboratory sources. The associated characteristics of spectroscopic purity and high time resolution provide unique capabilities for studying the atomic properties of highly-ionized atoms. This report is limited to a brief discussion of three classes of atomic systems that are experiencing current theoretical and experimental interest: precision structure of helium-like ions, fine structure of doubly-excited states, and lifetimes of metastable states. Specific measurements in each of these types of systems are mentioned, with emphasis on the relation to studies involving slow, highly-charged ions.

48705 (ANL-PHY—87-1, pp 49-73) **Experiments with recoil ions and other considerations.** Cocke, C.L. (Kansas State Univ., Manhattan). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

Some opportunities in collisions physics with slow, multiply charged ions are addressed. A distinction between inner and outer shell collisions is drawn. The applicability of recoil ion sources to outer shell collision systems is discussed, with emphasis on the quality of the beam desired. An example of an inner shell collision is discussed, and the usefulness of not pushing the collision energy too low is pointed out.

48706 (ANL-PHY—87-1, pp 75-88) **Collective behavior of multiply-excited states of atoms.** Lin, C.D. (Argonne National Lab., IL; Kansas State Univ., Manhattan). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

This paper is a synopsis of a talk presented during the workshop. The first part of the talk emphasizes that doubly-excited states and multiply-excited states are produced easily in multiply-charged ion-atom collisions. Data show that the peaks for single

capture can be separated in the energy gain spectroscopy. By using the coincidence technique, it is possible to show that multiple capture up to four electrons in a single collision can occur. The energy gain spectra for capture of one (k = 1), two (k = 2), three and four electrons are shown. The energy resolution of these energy-gain spectra is not adequate for resolving the different doubly- or multiply-excited states. The zero-degree spectroscopy advanced recently can achieve energy resolution of a fraction of one electron volt. These are now opportunities to study doubly-excited states systematically.

48707 (ANL-PHY—87-1, pp 101-124) **Multi-charged ion measurements in ion traps.** Church, D.A. (Texas A and M Univ., College Station). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

The production and confinement of multi-charged ions in ion traps at electronvolt energies are described, as well as recent experiments in which ions are externally injected into Penning traps. Possibilities for cooling externally-injected ions are discussed. Electron transfer measurements using confined multi-charged ions are reviewed. 58 refs., 10 figs.

48708 (ANL-PHY—87-1, pp 125-133) **High charge state, ion-atom collision experiments using accel-decel.** Bernstein, E.M.; Clark, M.W.; Tanis, J.A.; Graham, W.G. (Western Michigan Univ., Kalamazoo; Univ. of Ulster, Coleraine, Northern Ireland, United Kingdom). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

Recent studies of $_{16}S^{13+}$ + He collisions between 2.5 and 200 MeV, which were made using the accel-decel technique with the Brookhaven National Laboratory coupled MP tandem Van de Graaff accelerators, are discussed. Cross sections were measured for single electron-capture and -loss as well as K x rays correlated to electron-capture. Other planned ion-atom collision experiments requiring accel-decel are also presented.

48709 (ANL-PHY—87-1, pp 135-148) **Optical spectroscopy of slow, highly ionized atoms.** Lembo, L.J.; Danzmann, K.; Meyerhof, W.E.; Hansch, T.W. (Stanford Univ., CA). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

We have begun a research program, finally aiming at high-resolution laser spectroscopy of slow, highly-charged ions. The first phase of the program was devoted to the development of the Stanford Recoil Ion Source to produce the HQLE ions. During the second stage we have been studying the population of Rydberg levels by electron capture processes using wavelength spectra and polarization measurements. Emission spectra in the visible and near ultraviolet have been observed for transitions between Rydberg states of highly charged neon ions (Ne/sup q^+/ with q = 10 to 5), following electron capture from Na. Structure appears in those spectra for which the incoming ions carry L-shell core electrons. The optical emission cross sections are much smaller for these ions, and the radiation is significantly depolarized relative to ions whose transitions are seen as structureless. These effects are attributed to the inhibition of Stark mixing by core interactions.

48710 (ANL-PHY—87-1, pp 149-161) **Atomic physics at the LBL ECR [Electron Cyclotron Resonance] ion source.** Prior, M.H. (Lawrence Berkeley Lab., CA). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—). Contract AC03-76SF00098.

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

Atomic physics research with low energy, highly charged ions has been carried out at LBL using slow recoil ions produced by fast heavy ion impact on gas targets. This work has included electron capture collision studies and spectroscopy of two-electron ions, at the SuperHILAC and determination of recoil production cross-sections using U ion beams at the Bevalac. The author has participated in some of this work and outgrowths of all these efforts are continuing. Recently a program was begun to take advantage of the multiply charged ion beams available from the LBL Electron Cyclotron Resonance (ECR) ion source for atomic physics research. The charge states available from a modern ECR source are approximately similar to those from the recoil technique, but the currents available are generally higher and the range of elements is not restricted to those found in gases. Practically speaking, although an ECR is not without its degree of complexity and cost, these are substantially below those of a heavy ion accelerator complex. For the very lowest energies, i.e., a few eV, the recoil technique will remain attractive, and details of the recoil ion production process are interesting topics of study.

48711 (ANL-PHY—87-1, pp 183-195) **Science with multiply-charged ions at Brookhaven National Laboratory.** Jones, K.W.; Johnson, B.M.; Meron, M.; Thieberger, P. (Brookhaven National Lab., Upton, NY). 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—). Contract AC02-76CH00016.

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

The production of multiply-charged heavy ions at Brookhaven National Laboratory and their use in different types of experiments are discussed. The main facilities that are used are the Double MP Tandem Van de Graaff and the National Synchrotron Light Source. The capabilities of a versatile Atomic Physics Facility based on a combination of the two facilities and a possible new heavy-ion storage ring are summarized. It is emphasized that the production of heavy ions and the relevant science necessitates very flexible and diverse apparatus.

48712 (ANL-PHY—87-1, pp 291-299) **Atomic physics at ATLAS [Argonne Tandem-Linac Accelerator System].** Dunford, R.W. 1987. NTIS, PC A13/MF A01. File Number DE87013991. (CONF-870152—).

From Workshop on opportunities for atomic physics using slow, highly-charged ions; Argonne, IL, USA (12 Jan 1987).

This report lists the atomic physics experiments that are currently in progress at Argonne Tandem-Linear Accelerator System (ATLAS); future experiments that are being planned for the facility are described. Finally, the program of atomic physics experiments being planned for the ECR ion source is described.

48713 **(CONF-8706176—3) Cold highly ionized ions: Comparison of energies of recoil ions produced by heavy ions and by synchrotron radiation x rays.** Sellin, I.A.; Levin, J.C.; O, C.S.; Cederquist, H.; Elston, S.B.; Short, R.T.; Schmidt-Boecking, H. (Tennessee Univ., Knoxville (USA). Dept. of Physics; Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 22p. NTIS, PC A02. File Number DE87014792.

From Workshop and symposium on the physics of low energy, stored, and trapped particles; Stockholm, Sweden (14 Jun 1987).

The energies of highly excited, high-charge-state recoil ions produced by fast heavy-ion impact on target atoms ("hammer" method) have been compared with the energies of similar-charge-state recoil ions produced by vacancy cascades subsequent to inner-shell photoabsorption of tuned synchrotron radiation x rays ("scalpel" method). These comparisons show that the "hammer" method leads to recoil ion temperatures typically 4 orders of magnitude lower than those which occur in plasma sources in which ions of similar ionization and excitation states have comparable abundance, while the "scalpel" method leads to temperatures up to 6 orders of magnitude lower. Advantages and drawbacks of each method for potential precision spectroscopy of stored or trapped high charge state ions, and for production of extracted beams of low emittance for use in secondary ion-atom collision studies at eV to keV energies are discussed. 20 refs.

48714 **(DOE/ER/53217—1) [Theoretical atomic physics for fusion]: 1986 annual [progress] report.** (Auburn Univ., AL (USA)). 1986. Contract FG05-86ER53217. 5p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014579.

This report lists experiments completed at Auburn University in 1986 in theoretical/experimental atomic physics. The projects

include the following topics: (1) electron-impact ionization of iron; (2) electron-impact ionization cross sections of calcium; (3) dielectronic recombination of beryllium-like atomic ions; (4) dielectronic recombination of iron ions; and (5) electron-impact ionization of Xe^{9+}. (JDH)

48715 (DOE/ER/60420—1, pp 547-554) **Electron impact cross sections and spatial aspects of electron energy degradation in water vapor.** Dayashankar; Suh, S.T.; Green, A.E.S. (Univ. of Florida, Gainesville). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Using a comprehensive set of electron cross sections, they have carried out a Monte Carlo study of the spatial and energetic aspects of electron degradation in the energy range from 30 eV to 1 MeV. The results are given in terms of a four-dimensional spatial yield spectral distribution. This is represented by a simple approximate analytic form which is convenient to use for calculating the spatial distribution of the initial species created due to electron energy degradation. They also investigate the sensitivity of these electron transport results to some of the input cross sections. They have specifically examined the influence of the assumed form of cross sections for vibrational states on the gross yields. They conclude that in transport calculations it is important to use approximate forms with reasonable asymptotic limits. Finally, they call attention to molecular processes which are important in microdosimetry but whose cross sections are particularly uncertain.

48716 (DOE/ER/60420—1, pp 627-633) **X-ray incoherent scattering factor for molecular nitrogen as determined by high energy electron scattering.** Ketkar, S.N.; Bonham, R.A. (Indiana Univ., Bloomington). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A beam of high energy electrons, 25 keV, was scattered off an effusive gas jet of molecular nitrogen, and the energy loss spectrum from 0 to 800 eV was measured for scattering angles ranging from 0.3° to 2.0°. The energy loss spectra were converted to relative generalized oscillator strength (GOS) distributions and Bethe sum rule normalized to an absolute intensity scale. The x-ray incoherent scattering factor, S(K), as a function of momentum transfer, K, was determined by the use of the S(-1,K) GOS sum rule and compared with the predictions of theory. The effect of electron correlation on S(K) was determined by comparison of the experiment with molecular near Hartree-Fock calculations. Results from an extensive CI calculation were found to be in agreement with their experimental results, but proposed scaling of the CI theory appears to be incorrect.

48717 (DOE/ER/60514—1) **Direct infrared absorption of clusters in pulsed molecular beams: First progress report, May 1, 1986 to July 31, 1987.** Muenter, J.S. (Rochester Univ., NY (USA). Dept. of Chemistry). 1987. Contract FG02-87ER60514. 7p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014802.

This report describes accomplishments over the past year in research supported by this grant, and also outlines plans for the next year. The principal goal for future work is the continued development of a new molecular beam infrared absorption spectrometer, and the application of this instrument to the study of cluster molecules of atmospheric importance. Current results presented here document the present capabilities of this program. This report also describes the completion of previous work on excited vibrational states of stable molecules. Several reprints of journal articles are enclosed.

48718 (IAE—4269/1) **On possibility of the μHe/sup +/(2s1/2)He/sub 4/ and μHe/sup +/(2s1/2)He/sub 6/ symmetrical complex production in helium atmosphere.** Grechukhin, D.P.; Romanov, S.V.; Soldatov, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1986. 20p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702894.

A hypothesis of the μHe/sup +/(2S 1/2)He/sub n/ symmetrical complex production in pure helium atmosphere is discussed in connection with studying the possibility setting-up an experiments on observation of P-odd effects in the 2s1/2 -> 1s1/2 muon γ-transition caused by a neutral weak interaction of a muon and a nucleus. Within the framework of a relativistic version of the Xα-scattered wave method the conversion rate of 2s1/2 -> 1s1/2 muon transition on the electron shell of the complexes are estimated for n=4 (tetrahedron) and n=6 (octahedron). It is shown that the rate of such process exceeds the value of total rate of the μHe/sup +/(2s1/2) decay in pure helium atmosphere at 7-50 atm pressure that is specified by the experimenters several tens of times, but it agrees with the results of independent measurements carried out at 6 atm pressure. 33 refs.; 5 tabs.

48719 (INIS-SU—415, pp 18-24) **Hadronic atom in the Lee model.** Belyaev, V.B.; Solovtsova, O.P. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178. (N—18-86).

In JINR rapid communications. Collection.

The hadronic atom model is considered. The strong interaction of light particle with "nuclei" is described by the Lee model. The applicability of Deser's formula for the energy shift in such an atom is discussed. It is shown that for some mass ranges of the particles involved the Deser formula is violated. 7 refs.; 2 figs.

48720 (LBL—23710) **Systematic studies of molecular vibrational anharmonicity and vibration-rotation interaction by self-consistent-field higher derivative methods: Applications to asymmetric and symmetric top and linear polyatomic molecules.** Clabo, D.A. Jr. (Lawrence Berkeley Lab., CA (USA)). Apr 1987. Contract AC03-76SF00098. 195p. NTIS, PC A09/MF A01; 1; GPO Dep. File Number DE87014691.

Inclusion of the anharmonicity normal mode vibrations [i.e., the third and fourth (and higher) derivatives of a molecular Born-Oppenheimer potential energy surface] is necessary in order to theoretically reproduce experimental fundamental vibrational frequencies of a molecule. Although ab initio determinations of harmonic vibrational frequencies may give errors of only a few percent by the inclusion of electron correlation within a large basis set for small molecules, in general, molecular fundamental vibrational frequencies are more often available from high resolution vibration-rotation spectra. Recently developed analytic third derivatives methods for self-consistent-field (SCF) wavefunctions have made it possible to examine with previously unavailable accuracy and computational efficiency the anharmonic force fields of small molecules.

48721 (PPPL—2464) **Nonperturbative analysis of the two-level atom: Applications to multiphoton excitation.** Duvall, R.E.; Valeo, E.J.; Oberman, C.R. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Aug 1987. Contract AC02-76CH03073. 34p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000113.

Selective excitation in an atomic system subjected to a slowly varying external electromagnetic field is studied using a two-level model. Time evolution of the system is found using an approach which is nonperturbative in the field strength. There is no constraint to small values of the applied field, that is, the field (in appropriate energy units) need not be small compared to the difference in energies of the two levels. Rather, we prey upon the fact that the situation of interest to us is where the frequency of the exciting field is small compared to the frequency associated with the level difference. Transition probabilities and resonance conditions are found which circumscribe both the large and small field limits. In the weak field limit the previous results of high-order perturbation theory are readily recovered. For a monochromatic field the characteristic features of resonance excitation at high harmonic

number of the applied field are (a) extremely narrow resonance widths and (b) shifts in resonance positions which are strong functions of field intensity. Because of this sensitivity, we are able to demonstrate that when slow temporal evolution of the field amplitude is taken into account (e.g., due to finite pulse duration) the appropriate mean excitation rate is that due to the uncorrelated contribution of many resonances. The results of this analysis are used to estimate excitation rates in a specific atomic system, Cd^{12+}, which are then compared to multiphoton ionization rates. Our calculations suggest that the ionization rate exceeds the excitation rate by several orders of magnitude. 15 refs., 3 figs.

48722 **(UCID—21114) Time-dependent field equations for paraxial relativistic electron beams: Beam Research Program.** Sharp, W.M.; Yu, S.S.; Lee, E.P. (Lawrence Livermore National Lab., CA (USA)). 20 Jul 1987. Contract W-7405-ENG-48. 9p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000240.

A simplified set of field equations for a paraxial relativistic electron beam is presented. These equations for the beam electrostatic potential phi and pinch potential Phi identical to A/sub z/ - phi retain previously neglected time-dependent terms and for axisymmetric beams reduce exactly to Maxwell's equations.

48723 **Matching beams from relativistic electron guns into solenoidal transport systems.** Miller, R.B.; Poukey, J.W.; Shope, S.L.; Mazarakis, M.G. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Journal of Applied Physics;* **62**: No. 9, 3535-3538(1 Nov 1987).

In this paper we develop a new approach for controlling the electron trajectories in a relativistic electron beam diode which is based on appropriately contouring an externally generated, axial magnetic field. The technique provides a convenient method of matching a beam produced by a shielded source injector into a uniform solenoidal transport system of a linear induction accelerator. To illustrate the method, we analyze a simple diode geometry and compare the analytical results with trajectory code calculations.

48724 **Measurement and modeling of nitrogen resonance line profiles from an electrodeless discharge lamp.** Wood, D.R.; Skinner, G.B.; Lifshitz, A. (Departments of Physics and Chemistry, Wright State University, Dayton, Ohio 45435). *Journal of Chemical Physics;* **87**: No. 9, 5092-5096(1 Nov 1987).

Experimental profiles of the 1200 A resonance triplet of atomic nitrogen were measured for a variety of operating conditions of an end-on electrodeless lamp, and corresponding absorption curves were calculated. Each source profile was determined by fitting parameters to an empirical two-layer model, then convoluting with the instrumental function for comparison with experimental data. Each three-component profile was fitted with three adjustable parameters: an absorption parameter for each of the two layers and a third absorption parameter to adjust for radiation trapping. Curves of absorption as a function of atom concentration, calculated from these profiles, are very similar to the shock tube calibrations of Thielen and Roth in which a source of similar design has been used.

48725 **Multiphoton ionization studies of benzene in tetramethylsilane and n-pentane solutions.** Faidas, H.; Siomos, K. (Atomic, Molecular, and High Voltage Physics Group, Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831-6123). *Journal of Chemical Physics;* **87**: No. 9, 5097-5104(1 Nov 1987). Contract AC05-84OR21400.

The multiphoton ionization spectra of dilute solutions (approx. $<10^{-3}$ M) of benzene in tetramethylsilane (TMSi) and n-pentane (n-Pt) have been measured using linearly polarized light over the laser excitation wavelength (λ/sub exc/) region from 360 to 560 nm. Spectra measured with circularly polarized light are also reported for 460 <λ/sub exc/<540 nm. The order of the multiphoton ionization mechanisms that occur in different λ/sub exc/ regions has been determined, and their importance is discussed together with the observed polarization behavior. The polarization ratio and the "apparent" order of the ionization process were found to depend on the laser intensity. The ionization threshold of benzene in TMSi was estimated to lie between 6.6 and 5.9 eV, while in n-Pt between 7.36 and 6.8 eV.

48726 **Resonance structure in the vibrationally resolved photoelectron branching ratios and angular distributions of the $2\pi p1$ channel of NO.** Southworth, S.H.; Parr, A.C.; Hardis, J.E.; Dehmer, J.L. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* **87**: No. 9, 5125-5130(1 Nov 1987). Contract W-31-109-ENG-38.

We report on vibrationally resolved measurements of photoelectron angular distributions and branching ratios for $NO^+(2\pi^{-1})X\ ^1\Sigma^+$ using synchrotron radiation over $h\nu = 11.5$—26 eV. Normally weak vibrational levels are strongly enhanced below 18 eV, and the photoelectron asymmetry parameters and branching ratios display a vibrationally dependent, broad spectral structure over $h\nu \simeq 11$—18 eV. These observations may reflect the presence of the expected σ shape resonance, however, various interchannel coupling mechanisms may also be involved. Resonance structure in the photoelectron asymmetry parameters is also observed in the $h\nu \simeq 19$—22 eV region. This structure is likely associated with Rydberg excitations from the 4σ orbital.

48727 **Direct measurement of rotational energy transfer rate constants for $H^{35}Cl$ (v = 1).** Rohlfing, E.A.; Chandler, D.W.; Parker, D.H. (Combustion Research Facility, Sandia National Laboratories, Livermore, California 94550). *Journal of Chemical Physics;* **87**: No. 9, 5229-5237(1 Nov 1987).

We investigate the rotational energy transfer of $H^{35}Cl$ (v = 1) in collisions with thermal HCl at 298 K. Rotationally state-selective excitation of v = 1 over J = 1—6 is achieved by stimulated Raman pumping, and the rotational relaxation from the initially pumped level is monitored via 2+1 resonantly enhanced multiphoton ionization (REMPI) through the $E\ ^1\Sigma^+$—$X\ ^1\Sigma^+0$—1 band. The ions are detected in a time-of-flight mass spectrometer in order to ensure that only relaxation of $H^{35}Cl$ is observed. We present empirical correction factors for determining relative rotational populations from the REMPI spectral line intensities and extract the rate constants for rotational energy transfer from the time-dependent populations using numerical techniques. The excellent sensitivity of the REMPI technique makes it possible to monitor the relaxation on very short collisional time scales (<0.1 hard sphere collision) and thereby enables us to determine the rate constants for both single quantum and multiquanta rotational transitions directly, without the use of a simplifying model for the matrix of rate constants. The measured rate constants illustrate the importance of multiquanta transitions for HCl; such transitions account for —30% of the total population loss from a given rotational level. We compare our rate constants to those obtained in previous measurements on HCl (v = 1) and HF (v = 2). We find that the rate constants are not adequately described by models based solely on the rotational energy defect of the vibrationally excited molecule.

48728 **Observation of Autler-Townes splitting in the multiphoton ionization of H_2: Measurement of vibronic transition moments between excited electronic states.** Quesada, M.A.; Lau, A.M.F.; Parker, D.H.; Chandler, D.W. (Department of Chemistry, University of California, Santa Cruz, California 95064). *Physical Review [Section] A: General Physics;* **36**: No. 8, 4107-4110(15 Oct 1987).

We report the first observation of Autler-Townes splitting in multiphoton ionization of molecules and its application to measure vibronic transition moments between excited electronic states. The effect was observed in the two-color four-photon ionization of H_2 via the resonant levels $E,F\ ^1\Sigma/sub\ g/^+$, v = 6, J = 1 and $D\ ^1Pi/sub\ u/$, v = 2, J = 2. Calculations give good fits to the observed spectra. They yield a vibronic transition moment of 2.0 +- 0.5 a.u. between the above excited states, in agreement with the ab initio value 1.97 a.u. calculated by Huo and Jaffe.

48729 **Evaluation of cross section for electron capture by positrons.** Deb, N.C.; McGuire, J.H.; Sil, N.C. (Department of Physics, Kansas State University, Manhattan, Kansas 66506). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3707-3714(15 Oct 1987).

We present an improved method for the calculation of positronium-formation cross section from one-electron atomic targets of arbitrary charge Z/sub T/. The calculation is complete through second order in the collisional potentials. We use this technique to calculate the positronium-formation cross sections for 1s-1s electron capture from atomic hydrogen.

48730 **Distorted-wave calculations of the electron-impact ionization of highly ionized Na-like ions.** Griffin, D.C.; Pindzola, M.S.; Bottcher, C. (Joint Institute for Laboratory Astrophysics, University of Colorado National Bureau of Standards, Boulder, Colorado 80309). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3642-3653(15 Oct 1987).

We report on distorted-wave calculations of the electron-impact ionization cross sections and rate coefficients for the Na-like ions Ti/sup 11+/, Cr/sup 13+/, Fe/sup 15+/, and Ni/sup 17+/. The cross sections for direct ionization out of the 3s, 2p, and 2s subshells were determined using the configuration-average, distorted-wave approximation. In addition, excitation-autoionization contributions originating from inner-shell excitations of the type $2s^22p^63s \rightarrow 2s^22p^53snl$ (n = 3,4,5) and $2s^22p^63s \rightarrow 2s2p^63snl$ (n = 3,4) were calculated by employing the distorted-wave approximation and configuration-interaction, bound-state wave functions. Near threshold, the total-ionization cross sections in all four ions are enhanced by approximately a factor of 5 through excitation autoionization. These excitation-autoionization contributions are large, even though they have been substantially reduced by radiative decay to the bound states of the initial ion. Furthermore, although electron correlation has a minimal effect on the excitation cross sections, the magnitude of the branching ratios for autoionization is quite sensitive to configuration interaction in the autoionizing levels. This is especially true for the 2p→3d excitations, where configuration interaction between $2p^53s3d$ and $2p^53p^2$ can increase the magnitude of the autoionizing rates for levels within the $2p^63s3d$ configuration by as much as three orders of magnitude. Thus, for example, in the case of the 2p→3d excitation in Ni/sup 17+/, correlation increases the overall branching ratio for autoionization from 0.27 to 0.53.

48731 **L- and M-shell x-ray production cross sections of Nd, Gd, Ho, Yb, Au, and Pb by 25-MeV carbon and 32-MeV oxygen ions.** Andrews, M.C.; McDaniel, F.D.; Duggan, J.L.; Miller, P.D.; Pepmiller, P.L.; Krause, H.F.; Rosseel, T.M.; Rayburn, L.A.; Mehta, R.; Lapicki, G.; and others. (Department of Physics, North Texas State University, Denton, Texas 76203). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3699-3706(15 Oct 1987).

L- and M-shell x-ray production cross sections have been measured for thin solid targets of neodymium, gadolinium, holmium, ytterbium, gold, and lead by 25-MeV /sub //sub <1/ $_6{}^{12}$C/sup q/$^+$ (q = 4,5,6) and by 32-MeV /sub //sub <1/ $_8{}^{16}$O/sup q/$^+$ (q = 5,7,8). The cross sections were determined from measurements made with thin targets (less than 2.25 $\mu g/cm^2$). For projectiles with one or two K-shell vacancies, the target x-ray production cross sections were found to be enhanced over those for projectiles without a K-shell vacancy. The sum of direct ionization to the continuum (DI) plus electron capture (EC) to the L,M,N,. . . shells and EC to the K shell of the projectile have been extracted from the data. The results are compared to the predictions of first Born theories, i.e., plane-wave Born approximation for DI and Oppenheimer-Brinkman-Kramers formula of Nikolaev for EC, and to the ECPSSR that accounts for energy loss and Coulomb deflection of the projectile as well as for relativistic and perturbed stationary states of inner-shell electrons.

48732 **Interference between direct and rearrangement mechanisms for double ionization.** McGuire, J.H.; Burgdoerfer, J. (Department of Physics, Kansas State University, Manhattan, Kansas 66506). *Physical Review [Section] A: General Physics;* **36**: No. 8, 4089-4090(15 Oct 1987).

In double ionization at very high collision velocities Becker has pointed out that so-called direct mechanism obeys the dipole selection rule while the rearrangement mechanism is a monopole transition, and since s and p waves cannot interfere in total cross sections, interference between these mechanisms is forbidden. It is shown here that interference is possible due to dipole-forbidden contributions to the direct mechanism or rearrangement process.

48733 **Soft x-ray absorption cross section of argon determined by a variable absorber technique.** Jang, B.X.; Kirz, J. (State University of New York at Stony Brook, Physics Department, Stony Brook, New York 11794). *Applied Optics;* **26**: No. 18, 3823-3826(15 Sep 1987).

The x-ray absorption cross section of argon was measured in the 1.3—3.8-nm wavelength region. To correct for the presence of higher orders in the monochromator output, a variable pressure technqiue is used. The results are in good agreement with semiempirical calculations and earlier measurements.

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REFER ALSO TO CITATION(S) 49103

48734 **(AD-A—181924/2/XAB) Factors for MPD (magnetoplasma dynamic) thrustors. Annual report, 15 December 1983-14 December 1984.** Martinez-Sanchez, M. (Massachusetts Inst. of Tech., Cambridge (USA). Space Systems Lab.). 1 May 1986. 149p. NTIS, PC A07/MF A01.

The work resulted in: (a) a generalization of the classical anode depletion theory of onset to conditions below onset, giving insights as to anode drops and flow rearrangements; (b) analytical results describing the current concentration at cathode roots due to the Hall effect, and also the axial voltage distribution in a segmented thruster with suppressed axial current; (c) completion of studies on local plasma stability, with the conclusion that damping, mostly due to heat conduction makes it unlikely that onset can be due to a local instability. Work was initiated on a theory of flow in contoured channels.

48735 (INIS-SU—410, pp 28-30) **Paramagnons in nonequilibrium /sup 3/He-A.** Gulyan, A.M. 1986. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87780176.

Kratkie Soobshcheniya po Fizike.; (no.9).

In Experimental and theoretical physics. Collection.

Behaviour of dynamic spin susceptibility of superfluid /sup 3/He-A was investigated in case when the distribution function of Fermi one-particle excitations (helium atoms) is deviated from thermodynamic equilibrium. It is shown that with growth of nonequilibrium degree in the system of one-particle excitations the paramagnon attenuation decreases and changes the sign at some critical value of nonequilibrium - "paramagnon" instability of superfluid Fermi-liquid takes place. 10 refs.

48736 **(LA-UR—87-2613) The evolution of HOBO.** Clark, R.A. (Los Alamos National Lab., NM (USA)). Apr 1987. Contract W-7405-ENG-36. 7p. (CONF-8704168—2). NTIS, PC A02/MF A01; GPO Dep. File Number DE87014742.

From Workshop on particle methods in fluid dynamics and plasma physics; Los Alamos, NM, USA (13 Apr 1987).

HOBO is a free-Lagrangian hydrodynamics code which has been under development at Los Alamos for several years. It was based on free-Lagrangian tracer points and finite difference approximations to the equations of motion for fluid flow. This method will be reviewed briefly here. The use of an independent time step at each point is also described. This technique increases the speed of the code by factors of 10 to 20. How the code has been modified to achieve energy and momentum conservation and how this effects the independent time step is also included, as well as the explicit tracking of material interfaces.

48737 **(LA-UR—87-2804) Nucleation and growth of ^{3}He-B in ^{3}He-A.** Swift, G.W.; Buchanan, D.S. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 6p. (CONF-870873—14). NTIS, PC A02. File Number DE87014767.

From 18. conference on low temperature physics; Kyoto, Japan (20 Aug 1987).

The ^{3}He A → B transition is remarkable for a number of reasons. Because of the small bulk free energy difference between the two phases, the probability of homogeneous thermal nucleation of the B phase is vanishingly small. Thus the experimental fact that

the B phase nucleates readily from the A phase is not understood. The A → B transition is also remarkable in that when it occurs after cooling from above the critical temperature, it occurs in an extreme state of supercooling known as hypercooling. In this situation, the velocity of propagation of the A-B phase interface is controlled by microscopic phenomena rather than by thermal diffusion. We briefly review our recent work on both these topics, including the velocity of propagation of the A-B interface through hypercooled ^{3}He-A, a search for cosmic-ray-induced B-phase nucleation, and preliminary observations of B-phase nucleation locations and temperatures. 15 refs.

48738 **(LA-UR—87-2850) Point vortex dynamics: Recent results and open problems.** Aref, H.; Kadtke, J.B.; Zawadzki, I.; Campbell, L.J.; Eckhardt, B. (Los Alamos National Lab., NM (USA); California Univ., San Diego, La Jolla (USA). Dept. of Applied Mechanics and Engineering Sciences; Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung). 1987. Contract W-7405-ENG-36. 11p. (CONF-8709125—1). NTIS, PC A02. File Number DE87014759.

From IUTAM symposium on vortex motion; Tokyo, Japan (28 Sep 1987).

The concept of point vortex motion, a classical model in the theory of two-dimensional, incompressible fluid mechanics, was introduced by Helmholtz in 1858. Exploration of the solutions to these equations has made fitful progress since that time as the point vortex model has been brought to bear on various physical situations: atomic structure, large-scale weather patterns, "vortex street" wakes, vortex lattices in superfluids and superconductors, etc. The point vortex equations also provide an interesting example of transition to chaotic behavior. We give a brief historical introduction to these topics and develop two of them in particular to the point of current understanding: steadily moving configurations of point vortices; and collision dynamics of vortex pairs. 26 refs.

48739 **(LA-UR—87-2897) FLIP [fluid-implicit-particle]: A low-dissipation, particle-in-cell method for fluid flow.** Brackbill, J.U.; Kothe, D.B.; Ruppel, H.M. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 24p. (CONF-8704168—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014745.

From Workshop on particle methods in fluid dynamics and plasma physics; Los Alamos, NM, USA (13 Apr 1987).

Since convective transport is the largest source of computational diffusion, FLIP (fluid-implicit-particle) eliminates convection, and uses instead a Lagrangian formulation. In FLIP, as in PIC, particles represent the fluid: a grid is used only to calculate interactions among particles. FLIP is an adaptation to fluid flows of the implicit moment method for plasma simulation. The particles carry coordinates, momentum, mass and energy; everything necessary to describe the fluid. Using the particle data, Lagrangian moment equations solved on a grid advance the particle variables from time step to time step. An adaptive grid and implicit time differencing extend the method to singular and low-speed flows. Aspects of FLIP's properties are illustrated by calculations of the Rayleigh-Taylor instability, an unstable, subsonic stream, and a supersonic jet. The results demonstrate FLIP's applicability to the many problems where low dissipation is crucial to correct modeling. 21 refs.

48740 **Nearly monodisperse fluids. I. Monte Carlo simulations of Lennard-Jones particles in a semigrand ensemble.** Kofke, D.A.; Glandt, E.D. (Department of Chemical Engineering, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6393). *Journal of Chemical Physics;* **87**: No. 8, 4881-4890(15 Oct 1987).

A hybrid, semigrand ensemble is applied to the simulation of mixtures of very many components. The independent variables are temperature, density, and the distribution of activity ratios. The system samples different compositions, with particles changing species identities during the simulation. Thus, the method is particularly well suited for applications to polydisperse mixtures. Results are presented for the simulation of mixtures of Lennard-Jones particles continuously varying in size and energy parameters. Four system sizes are used: 108, 216, 343, and 512 particles. The effect of degree of polydispersity is investigated by varying the width of the imposed distribution of activity ratios, which is Gaussian. It is found that very large systems are needed to describe wide distributions, due to the presence of ever-larger particles. A limit on sizes eventually arises from the competition of energetic and entropic effects. Methods for determining phase equilibrium for these mixtures are also discussed.

48741 **Superfluid plasmas: Multivelocity nonlinear hydrodynamics of superfluid solutions with charged condensates coupled electromagnetically.** Holm, D.D.; Kupershmidt, B.A. (Theoretical Division and Center for Nonlinear Studies, Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3947-3956(15 Oct 1987).

Four levels of nonlinear hydrodynamic description are presented for a nondissipative multicondensate solution of superfluids with vorticity. First, the multivelocity superfluid (MVSF) theory is extended to the case of a multivelocity superfluid plasma (MVSP), in which some of the superfluid condensates (protons, say) are charged and coupled electromagnetically to an additional, normal, charged fluid (electrons). The resulting drag-current density is derived due to the electromagnetic coupling of the condensates with the normal fluids. For the case of one charged condensate, the MVSP equations simplify to what we call superfluid Hall magnetohydrodynamics (SHMHD) in the approximation that displacement current and electron inertia are negligible, and local charge neutrality is imposed. The contribution of the charged condensate to the Hall drift force is determined. In turn, neglecting the Hall effect in SHMHD gives the equations of superfluid magnetohydrodynamics (SMHD). Each set of equations (MVSF, MVSP, SHMHD, and SMHD) is shown to be Hamiltonian and to possess a Poisson bracket associated with the dual space of a corresponding semidirect-product Lie algebra with a generalized two-cocycle defined on it. Topological conservation laws (helicities) associated with the kernels of these Lie algebras are also discussed as well as those associated physically with generalized Kelvin theorems for conservation of superfluid circulation around closed loops moving with the normal fluid.

48742 **Ground-state phases of polarized deuterium species.** Panoff, R.M.; Clark, J.W. (Department of Physics, Kansas State University, Manhattan, Kansas 66506). *Physical Review [Section] B: Condensed Matter;* **36**: No. 10, 5527-5539(1 Oct 1987).

Microscopic prediction of the ground-state phase of electron-spin-aligned bulk atomic deuterium (Darrow-down) is attempted, based on the variational Monte Carlo method. The accurate pair potential of Kolos and Wolniewicz is assumed, and three versions of Darrow-down are considered, which, respectively, involve one, two, and three equally occupied nuclear spin states. The most definitive results on the zero-temperature equations of state of these systems are obtained with optimized ground-state trial wave functions incorporating Jastrow pair correlations, triplet correlations, and momentum-dependent backflow effects. The species Darrow-down$_3$ is bound already at the pure Jastrow level, while the energy expectation value of Darrow-down$_2$ dips below zero upon supplementing the Jastrow description by triplets and momentum-dependent backflow. The variational energy of Darrow-down$_1$ remains positive under all current refinements of the ground-state trial function. We conclude that the systems Darrow-down$_3$ and Darrow-down$_2$, if they could be manufactured and stabilized at relevant densities, would be Fermi liquids at sufficiently low temperature; on the other hand, it is likely that Darrow-down$_1$ would remain gaseous down to absolute zero.

48743 **Structural relaxation in dense hard-sphere fluids.** Ladd, A.J.C.; Edward Alley, W.; Alder, B.J. (Lawrence Livermore National Laboratory, Livermore, California 94550). *Journal of Statistical Physics;* **48**: No. 3, 1147-1156(Sep 1987). Contract W-7405-ENG-48.

The long-time decay of the shear-stress autocorrelation function is shown to be quantitatively related to the decay of correlations between the orientation of "bonds" connecting colliding pairs of particles. Within computational uncertainties, we find that orientational correlations in high-density fluids decay as a "stretched" exponential in time, with an exponent that is independent of densi-

ty. However, at low densities the decay is exponential. In two-dimensional systems the decay is exponential, even at high density.

48744 Rigorous upper bounds for transport due to passive advection by inhomogeneous turbulence. Krommes, J.A.; Smith, R.A. (Princeton University, Plasma Physics Laboratory, P.O. Box 451, Princeton, New Jersey 08544-0451). *Annals of Physics (New York);* 177: No. 2, 246-329(1 Aug 1987).

A variational procedure, due originally to Howard and explored by Busse and others for self-consistent turbulence problems, is employed to determine rigorous upper bounds for the advection of a passive scalar through an inhomogeneous turbulent slab with arbitrary generalized Reynolds number R and Kubo number K. In the basic version of the method, the steady-state energy balance is used as a constraint; the resulting bound, though rigorous, is independent of K. A pedagogical reference model (one dimension, K = ∞) is described in detail; the bound compares favorably with the exact solution. The direct-interaction approximation is also worked out for this model; it is somewhat more accurate than the bound, but requires considerably more labor to solve. For the basic bound, a general formalism is presented for several dimensions, finite correlation length, and reasonably general boundary conditions. Part of the general method, in which a Green's function technique is employed, applies to self-consistent as well as to passive problems and thereby generalizes previous results in the fluid literature. The formalism is extended for the first time to include time-dependent constraints, and a bound is deduced which explicitly depends on K and has the correct physical scalings in all regimes of R and K. Two applications from the theory of turbulent plasmas are described: flux in velocity space, and test particle transport in stochastic magnetic fields. For the velocity space problem, the simplest bound reproduces Dupree's original scaling for the strong turbulence diffusion coefficient.

48745 Influence of a heated leading edge on boundary layer growth, stability, and transition. Landrum, D.B.; Macha, J.M. (Sandia National Labs., Albuquerque, NM). *AIAA (American Institute of Aeronautics and Astronautics) Journal;* 12(Jun 1987). (AIAA-Paper—87-1259; CONF-870622—).

From 19. fluid dynamics, plasma dynamics, and laser conference; Honolulu, HI, USA (8 Jun 1987).

This paper presents the results of a combined theoretical and experimental study of the influence of a heated leading edge on the growth, stability, and transition of a two-dimensional boundary layer. The findings are directly applicable to aircraft wings and nacelles that use surface heating for anti-icing protection. The potential effects of the non-adiabatic condition are particularly important for laminar-flow sections where even small perturbations can result in significantly degraded aerodynamic performance. The results of the study give new insight to the fundamental coupling between streamwise pressure gradient and surface heat flux in laminar and transitional boundary layers. 13 references.

6450 High Energy Physics

REFER ALSO TO CITATION(S) 47805, 48867, 49055

48746 (INIS-SU—416) JINR rapid communications. Collection. (Joint Inst. for Nuclear Research, Dubna (USSR)). 1986. 51p. (In Russian). (N—17-86). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179.

Individual papers in this collection are abstracted separately. (LEW)

6451 Particle Interactions And Properties - Experimental

REFER ALSO TO CITATION(S) 47418, 48826

48747 (BNL—40200) Increased statistics in $\pi p p \rightarrow$ phi phi n and the status of glueball production. Lindenbaum, S.J.; Etkin, A.; Foley, K.J.; Hackenburg, R.W.; Longacre, R.S.; Love, W.A.; Morris, T.M.; Platner, E.D.; Saulys, A.C.; Chan, C.S. (Brookhaven National Lab., Upton, NY (USA); City Coll., New York (USA)). 1987. Contract AC02-76CH00016. 4p. (CONF-870632—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014913.

From International Europhysics conference on high energy physics; Uppsala, Sweden (25 Jun 1987).

The statistics for the OZI forbidden reaction $\pi^- p \rightarrow$ phi phi n have been doubled to a total of 6658 events, allowing extension of the phi phi partial wave analysis. A three-pole K-matrix fit was also obtained and Breit Wigners parameters deduced. Mass spectra, amplitudes from the partial wave analysis, and Argand diagrams for each wave are given. (LEW)

48748 (CEA-N—2505) Study of the production of muon pairs at the Petra e/sup +/e/sup -/ collider: measurements of the cross section and of the electroweak asymmetry. Ould Saada, F. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Physique des Particules Elementaires). Nov 1986. 267p. (In French). NTIS (US Sales Only), PC A12/MF A01. File Number DE87752580.

The production of muon pairs is studied using the CELLO detector operating on the e/sup +/e/sup -/ collider PETRA at the DESY laboratory in Hamburg (West Germany). An integrated luminosity of 45 pb/sup -1/ has been accumulated between $\sqrt{S}$ = 38.3 GeV and $\sqrt{S}$ = 46.8 GeV in the center of mass system. At these energies the interferences between the photon and the neutral intermediate boson Z/sup 0/ gives rise to a sizeable forward-backward charge asymmetry. The total cross-section measured at different energies follows the 1/S dependence predicted by quantum electrodynamics. The asymmetries measured at the average energies of $\langle\sqrt{S}\rangle$ = 39 GeV and $\langle\sqrt{S}\rangle$ = 44 GeV are in good agreement with the values predicted by the Standard Model, -11.3% and -15.3% respectively. The results obtained are compatible with those other PETRA experiments.

48749 (DOE/ER/02289—T5) [High energy experimental physics]: Progress report. Rosen, J. (Northwestern Univ., Evanston, IL (USA)). 1987. Contract AC02-76ER02289. 171p. NTIS, PC A08. File Number DE87013516.

This report discusses experiments done at Fermilab. Studies are done on the production of charm particles in hadronic interactions, drift chambers, Fastbus routines and microcodes for High Energy Physics experimental application. Also Budget and future experimental proposals are considered. (LSP)

48750 (EFI—812(39)-85) Exotic baryon resonances. Modern status. Possibilities to search and investigate. Bagdasaryan, L.S.; Galumyan, P.I.; Grigoryan, A.A.; Kazaryan, S.P.; Khachatryan, G.N.; Oganesyan, A.G.; Vartapetyan, H.H. (Erevanskij Fizicheskij Inst. (USSR)). 1985. 42p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87702883.

A possibility to investigate the exotic baryon resonances with qqqqq quark composition, in the systems $p\pi$/sup +/π/sup +/, $\Lambda\pi$/sup -/π/sup -/, Σ/sup -/π/sup -/, etc. possessing exotic quantum numbers of isospin is considered. The most favourable reactions and kinematical regions where an effective search for the exotic baryons is possible are grounded. The contribution of the background subprocesses to the investigated systems is analyzed in various reactions and momenta configurations of the particles. The analysis shows that the search for the I=5/2 resonances in the system $p\pi$/sup +/π/sup +/(Δ/sup ++/π/sup +/) is more reasonable in the π/sup +/p-interaction process, this system carrying the main portion of momentum in the lab. system. The exotic hyperons with S=-1 srangeness and I=2 isospin are to be searched in the fast-flying systems $\Lambda\pi$/sup -/π/sup -/ (Σ*/sup -/(1385)π/sup -/

) and Σ/sup -/π/sup -/ produced in the reactions on the K/sup -/ beams. The cross sections of the production of the E/sub 55/-baryon (J/sup p/=5/2/sup +/, I=5/2) in the π/sup +/p -> E/sub 55//sup +++/π- and π/sup +/p -> E/sub 55//sup ++++/ x processes are theoretically estimated. The estimations show that in the experiments with the OMEGA spectometer at CERN one can get a substantial increase in the statistics as compared to that available, thus providing a detailed analysis of the pπ/sup +/π/sup +/ system on the high confidence level. The question of investigation of the exotic baryon Regge trajectories in the processes of the inclusive production of ordinary (nonexotic) Δ/sup ++/(1232), Σ*/sup +/(1385)- and Σ/sup +/-resonances in the π/sup -/-beam fragmentation region is also considered. 31 refs.

48751 **(IFVE-OEF—85-93) Relative yields of the eta mesons produced by 10 GeV pions and kaons.** Akimenko, S.A.; Belousov, V.I.; Blik, A.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 8p. (In Russian). (SERP-E—102). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702897.

The relative yield of eta-mesons produced by positive kaons and pions in the beam fragmentation region X/sub F/ > 0.5 was measured by means of the lead glass Cerenkov hodoscope. The data relation to the singlet-octet mixing angle value and some dynamic details of the eta-production are discussed in frames of the quark fusion model. 10 refs.; 3 figs.

48752 **(IFVE-OEF—86-132) Oscillations of polarization asymmetry in the π/sup -/parrow up -> π/sup 0/n reaction in the range of tau ≦ 3(GeV/c)/sup 2/.** Apokin, V.D.; Arestov, Yu.I.; Belikov, N.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 4p. (In Russian). (SERP-E—149). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702898.

Submitted to the journal Sov. J. Nucl. Phys. .

The polarization asymmetry in the π/sup -/p -> π/sup 0/n reaction up to t — 3 (GeV/c)/sup 2/ has been measured for the first time. The measurements have been carried out at 40 GeV/c. The asymmetry oscillations have been observed at t ≦ 3 (GeV/c)/sup 2/. The results are compared with theoretical models. 10 refs.; 1 fig.; 1 tab.

48753 **(IFVE-OEF—86-155) Observation of a narrow meson with a mass of 1750 MeV decaying into etaeta pair.** Aldi, D.; Binon, F.; Brikman, K. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 4p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702899.

Submitted to the journal Zh. Ehksp. Teor. Fiz. .

A narrow meson is observed in π/sup -/p collisions at 38 GeV/c which decays into etaeta pair. The experiment has been performed at the Serpukhov accelerator using GAMS-2000 multiphoton hodoscope spectrometer. The mass of this new meson state is 1750 +- 8 MeV. Its width is less than 50 MeV. The spin-parity is J/sup PC/=0/sup ++/ or, less probable, 2/sup ++/; the isospin and G-parity is O/sup +/. The production cross section σ x BR is found to be 3.5 +- 1.5 nb. The t-dependence of the cross section is described by exp(b-bart) with the slope b-bar=3.8 +- 1.5 (GeV/c)/sup -2/. 11 refs.; 3 figs.

48754 **(IFVE-OEIPK—85-20) Study on the multiple pion production in the nondiffraction exclusive K/sup -/p interactions at 32.1 Gev/c.** Patalakha, D.I.; Bumazhnov, V.A.; Bogolyubskij, M.Yu. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 17p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702900.

Submitted to the journal Sov. J. Nucl. Phys. .

The multipion production in the exclusive nondiffractive reactions K/sup -/p -> K/sup -/pl (π/sup +/π/sup -/), 1 ≦ l ≦ 4, at 32 GeV/c is studied. The diffractive component in reactions K/sup -/p -> K/sup -/p π/sup +/π/sup -/ and K/sup -/p -> K/sup -/p2 (π/sup +/π/sup -/) was selected by the maximum rapidity gap method. It is shown, that an independent emission model (IEM) with the leading particle effect taken into account can reproduce the main features of the longitudinal and transverse momenta distributions of pions. However the π/sup -/-mesons emitted in the forward hemisphere of the c.m.s. are systematically more fast than it is predicted by IEM. The azimuthal correlations between the transverse momenta of the pions and the leading hadrons are also studied. 11 refs.; 8 figs.; 2 tabs.

48755 **(IFVE-OEIPK—86-158) Inclusive production of K/sup */ and E/sup */ resonances in the pp interactions at 360 GeV/c at European hybrid spectrometers.** Aziz, T.; Bailli, D.L.; Banerzh'e, S. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 14p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702901.

Submitted to the journal Sov. J. Nucl. Phys. .

The inclusive production of strange meson and baryon resonances in 360 GeV/c pp interactions have been studied. Cross sections for K*+(892) are estimated to be 4.42 +- 0.62 mb and 2.54 +- 0.47 mb, and those for Σ/sup +/(1385) and Σ/sup -/(1385) are 0.67 +- 0.11 mb and 0.26 +- 0.07 mb, respectively. Longitudinal and transverse momentum distributions for K*(892) and Σ(1385) are presented as well as for their decay products K/sub s//sup 0/ and Λ. It is shown that approximately 50 % of all K/sub s//sup 0/ are decay products of K*, and more than 28 % of all Λ originate from Σ*/sup +-/ decays. Distributions over X/sub F/ and p/sub T//sup 2/ variables of indirect K/sub s//sup 0/ and Λ mainly reproduce the shape of the corresponding distributions for all K/sub s//sup 0/ and Λ. 31 refs.; 8 figs.; 2 tabs.

48756 **(IFVE-OEIPK—86-168) Neutral and charged D/sup */ meson production in pi /sup -/p interactions at 360 Gev/c.** Agyular-Benitez, M.; Allison, V.V.; Bagg, V.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702902.

Submitted to the jornal Sov. J. Nucl. Phys. .

The inclusive cross sections for forward D* meson production at 360 GeV/c in π/sup -/p interactions are determined: (π/sup -/p -> D*/sup +-/ + X; x/sub F/ > 0)= (5.0+2.3)-(5.0-1.8) μb, (π/sup -/p -> D*/sup 0/ + X; x/sub F/ > 0) = (7.3 +- 2.9) μb. The D* mesons are produced centrally, without any significant non-central component. D* production dominates the total charm D meson production and, in particular, saturates D/sup 0/ production. 8 refs.; 5 figs.

48757 **(IFVE-ONF—85-188) Neutral strange particle production in neutrino interactions of charged current at energy of 3-30 GeV.** Ammosov, V.V.; Ardashev, E.N.; Ivanilov, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702903.

Submitted to the journal Zeit. Phys. .

Neutral strange particle production in neutrino interactions with nuclei in the SCAT bubble chamber has been studied. The neutrino energy dependence and hadron system invariant mass square dependence of yields for K/sup 0/-mesons and Λ-hyperons has been discussed. The estimations of total yields of strange and charm particles have been made. The behaviour of inclusive spectra for neutral strange particle has been investigated. 20 refs.; 6 figs.; 5 tabs.

48758 **(IFVE-ONF—86-94) Inclusive production of rho/sup 0/ and K/sup *0/ mesons in the ν-bar/sub μ/N charged-current interactions.** Ammosov, V.V.; Burtovoj, V.S.; Gapienko, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703237.

Submitted to the journal Yad. Fiz. .

Inclusive rho/sup 0/ and K*/sup 0/ production has been studied in ν-bar/sub μ/N charged current interactions, using a sample of 4030 events obtained in 15-ft bubble chamber filled with a 64% Ne-H/sub 2/ mixture and exposed in the FNAL wide-band antineutrino beam. An average multiplicities of 0.13 +- 0.02 rho/sup 0/ and 0.049 +- 0.014 K*/sup 0/ per event at a mean hadronic mass W of 4.3 GeV are obtained. Corresponding ratios of these mean multiplicities to ones of π/sup -/ and K/sup 0/ mesons are equal <n(rho/sup 0/) >/<n(π/sup -/)>=0.070 +- 0.015 and <n(K*/sup 0/)>/>n(K/sup 0/)>0.26 +- 0.08. The rho/sup 0/ production properties are studied in terms of various kinematical variables. The experimental results are compared with those obtained from (anti)-neutrino-proton interactions and with predictions of the Lund fragmentation model. 27 refs.; 7 figs.

48759 **(IFVE-ONF—86-135) Study on the inclusive characteristics of rho/sup 0/ and K*/sup 0/(890) mesons in quark jet of ν-barN interaction of charged current.** Ammosov, V.V.; Burtovoj, V.S.; Gapienko, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703238.

Submitted to the journal Sov. J. Nucl. Phys. .

Inclusive characteristics of rho/sup 0/ and K*/sup 0/(890) mesons have been studied in the antineutrino charged current induced quark jet, using a sample of 3000 events obtained in the Fermilab 15-ft bubble chamber, Z-distributions of the rho/sup 0/, K*/sup 0/ mesons and N(rho/sup 0/)/N(π/sup 0/), N(K*/sup 0/)/N(rho/sup 0/) ratios in the jet are measured. The fraction of leading charged pions resulting from the rho/sup 0/ decays are estimated. The experimental data are compared with predictions of the Lund fragmentation model. 18 refs.; 5 figs.

48760 **(IFVE-ONF—86-160) Charged current antineutrino-induced coherent negative pion production off neon.** Ammosov, V.V.; Bel'kov, A.A.; Asratyan, A.E. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 8p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703240.

Submitted to the journal Sov. J. Nucl. Phys. .

Antineutrino scattering off neon nuclei have been used to select 61 +- 12 events of negative pion coherent production. The obtained experimental data have been compared with theoretical predictions and with results of some other experiments. The values obtained for coherent production of negative pions at different antineutrino energies do not contradict the experimental results and theoretical model predictions. 14 refs.; 5 figs.

48761 **(ITEF—53-1985) Correlations of cumulative hadrons in hadron-nuclear interactions.** Bayukov, Yu.D.; Vlasov, A.V.; Vorob'ev, L.S. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 19p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703273.

Dependences of correlation coefficient R/sub pp/ of cumulative protons on their energy in π/sup -/A interaction with incidence π/sup -/-meson momenta of 2.5 GeV/c (on Al, Cu, V nuclei) and 5.0 GeV/c (on V nucleus), as well as R/sub pd/ and R/sub ppp/, are investigated. Conclusions are made that R/sub pp/ dependence on total energy of secondary particles is weak. R/sub pp/ in π/sup -/V interactions increases with an increase in π/sup -/-meson initial momentum. For the above-mentioned initial momenta of π/sup -/-mesons R/sub pp/ values in π/sup -/A interactions are lower than in pA interactions at 7.5 GeV/c. R/sub pd/ was measured in the pPb reaction at 7.5 GeV/c. Correlation coefficients of R/sub pd/ and R/sub pp/ are similar. 13 refs.; 4 figs.

48762 **(ITEF—76-1986) Study on the baryon exchange π/sup +/ + p -> Δ/sup ++/ + rho/sup 0/ reaction at 3.94 GeV/c.** Aref'ev, A.V.; Bayukov, Yu.D.; Grishuk, Yu.G. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 23p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703275.

The reaction of simultaneous resonance production of Δ/sup ++/ and rho/sup 0/ on hydrogen is studied at 3.94 GeV/c π/sup +/-meson momentum in the range of variation of transferred momentum squared 0 $\leqq$ U' = U/sub max/ - U $\leqq$ 0.6 GeV/sup 2/. The measured parameters of the differential cross section dσ/dU'=A x exp (-BxU') of production reaction of Δ and rho resonances are equal to B=1.77 +- 0.3 GeV/sup 2/; A=26.6 +- 4.0 μb/GeV/sup 2/. The resonances are produced in baryon exchange reaction. 12 refs.; 12 figs.

48763 **(ITEF—97-1985) Search for the charm particles in neutrino experiment with nuclear photoemulsion placed inside the Fermilab 15-foot bubble chamber.** Vojvodik, L.; Smart, V.; Vajsenberg, A.O. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 27p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703278.

Results of experiment on search for charmed particle decay are presented. Cryogenically sensitive BR-2 nuclear photoemulsion placed inside the Fermilab 15-foot bubble chamber was exposed to the wide-band muon neutrinos beam. Analysis of five detected short-lived particles decay, four of which are identified as decays of D/sup +/, D/sup 0/, D/sup 0/ and Λ/sub c//sup +//F/sup +/ charmed particles, is presented. 10 refs.; 5 figs.; 2 tabs.

48764 **(ITEF—130-1986) Production of cumulative protons with 0.6-1.83 GeV/c momenta.** Boyarinov, S.V.; Gerzon, S.A.; Kats, M.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 22p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703286.

Invariant cross sections of cumulative proton production on Be, Al, Cu, Ta nuclei with large cumulative numbers up to X=4 have been measured. Directions for the interaction of an incident proton with more than six nuclear nucleons and for the change in the character of the invariant cross section dependence on the transverse momentum at X $\simeq$ 1.8 are obtained. 22 refs.; 11 figs.

48765 **(ITEF—150-1986) Search for the exotic baryon resonances with isospin I=5/2 in the π/sup +/p -> pπ/sup +/π/sup +/π/sup -/ reaction at π/sup +/ meson momentum of 3.94 GeV/c.** Aref'ev, A.V.; Bayukov, Yu.D.; Grishuk, Yu.G. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 20p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703289.

For the first time, in the π/sup +/p -> pπ/sup +/π/sup +/π- reaction at 3.94 Gev/c initial momentum an experimental evidence has been observed for exotic resonances with I=5/2 isospin and masses of 1.48 +- 0.02 and 1.65 +- 0.03 GeV in π/sup -/-backward production. In the transfer momentum interval u' < 0.1 GeV/sup 2/ production cross sections for M/sub 1/=1.48 and M/sub 2/=1.65 GeV/c/sup 2/ resonance equal, respectively, σ/sub 1/=0.35 +- 0.08 σ/sub 2/=0.37 +- 0.13 μb. 7 refs.; 9 figs.

48766 **(LAL—86-29) Observation of eta/sub c/ -> rho/sup 0/rho/sup 0/ and review of other eta/sub c/ decay modes.** Jean-Marie, B. (Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire). Oct 1986. 4p. (CONF-860701—85). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752584.

From 23. international conference on high-energy physics; Berkeley, CA, USA (16 Jul 1986).

Branching ratio measurements for eta/sub /c decays into PHIPHI, K/sup +/K/sup -/eta/sup 0/, K/sup 0//sub S/K/sup +-/π/sup -+/, pantip are presented. For the previously unobserved rho/sup 0/rho/sup 0/ mode a preliminary measurement is reported. The dominant contribution of the rho/sup 0/rho/sup 0/ intermediate state to the eta/sub c/ decay into 4π/sup +-/ is evidenced by a multichannel analysis and strongly supported by the study of pseudoscalar contribution and rho mass cuts. 8 refs.

48767 **(LAL—86-37) Recent results on jet-physics and QCD tests by UA1 and UA2 at the CERN proton-antiproton collider.** Fayard, L. (Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire). Nov 1986. 24p. (CONF-860977—3). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752585.

From Antiproton '86: European symposium on nucleon-antinucleon interactions; Thessalonika, Greece (1 Sep 1986).

The jet cross-sections of the UA1 and UA2 experiments at CERN are discussed and compared with the predictions of QCD at order α/sub s//sup 2/ (inclusive and two-jet cross sections), α/sub s//sup 2/ (three-jet events), α/sub s//sup 4/ (four-jet events). Inclusive cross-section has been measured for production of high-P/sub T/ direct photons and is compared with QCD predictions. A status report is given on the search for the decay of the intermediate vector bosons W and Z into a quark-antiquark pair. 13 figs., 39 refs.

48768 **(LBL—23548) rho$^0\gamma$ production in photon photon interactions.** Derby, K.A. (Lawrence Berkeley Lab., CA (USA)). Aug 1987. Contract AC03-76SF00098. 104p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE88000474.

The subject of this dissertation is the production of the rho$^0\omega$ final state in photon photon interactions. The production of the rho$^0\omega$ final state has been of interest primarily because of its similarity to the related process $\gamma\gamma \rightarrow$ rho^{0}rho^0. The cross section for rho^{0}rho^0 production demonstrates a peaking near threshold, the mechanism of which has been the subject of considerable speculation. The data sample used for the analysis was obtained using the TPC detector facility at the PEP e^+e^- storage ring, and corresponds to an integrated e^+e^- luminosity of 64 pb^{-1} at 29 GeV center of mass energy. Our estimate of the rho$^0\omega$ cross section is compared to the predictions of several models which have been used to account for the observed rho^{0}rho^0 cross section. The experimental results are consistent with the predictions of a threshold enhancement model, as well as those of a four quark (qq anti q anti q) resonance model. However, they disagree with the predictions of a t-channel factorization approach.

48769 (LBL-PUB—615, pp A.19-A.27) **High energy elementary particle physics.** Emmanuelli, J.L. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

This research focuses on cryo-cycling testing of kapton covered multilayer board in order to observe the behavior and continuity of the signal traces of each board at low temperature conditions, which is a requirement of the liquid argon calorimetry.

48770 **(SLAC-PUB—4386) Experimental studies of electromagnetic properties of few body systems.** Bosted, P.E. (American Univ., Washington, DC; Stanford Linear Accelerator Center, Menlo Park, CA (USA)). Aug 1987. Contract AC03-76SF00515. 8p. (CONF-8706200—1). NTIS, PC A02. File Number DE87014610.

From CEBAF summer workshop; Newport News, VA, USA (22 Jun 1987).

An overview is given of some recent and planned experiments which have or will substantially increase our knowledge of the electromagnetic properties of few body systems. Specific examples include the proton and neutron elastic form factors, the deuteron elastic form factors, deuteron threshold electrodisintegration and quasi-elastic scattering, deuteron photodisintegration, and finally measurements of cross sections in deep inelastic scattering from hydrogen, deuterium, and iron. 47 refs., 13 figs. (DWL)

48771 **Search for neutral heavy leptons from ν - N scattering.** Mishra, S.R.; Auchincloss, P.; Blair, R.; Haber, C.; Leung, W.C.; Ruiz, M.; Oltman, E.; Sciulli, F.J.; Shaevitz, M.H.; Smith, W.H.; and others. (Columbia University, New York, New York 10027). *Physical Review Letters;* **59**: No. 13, 1397-1400(28 Sep 1987).

Results are presented on a search for neutral heavy leptons that couple to muon neutrinos in high-energy neutrino-nucleon interactions (E/sub ν/ = 30—230 GeV). No evidence for such particles is observed. We obtain upper limits on the coupling of neutral neavy leptons to ν/sub μ/ below Fermi strength in the mass range 0.25—14 GeV/c^2.

48772 **New results on the E(1420)/iota(1460) meson in hadroproduction.** Chung, S.U. (Brookhaven National Lab., Upton, NY 11973). pp 725-728 of Proceedings of the XXIII international conference on high energy physics. Loken, S.C. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1987). (CONF-860701—). Contract AC02-76CH00016.

From 23. international conference on high-energy physics; Berkeley, CA, USA (16 Jul 1986).

A mini-review, with emphasis on new results, is given on the status of the hadroproduced E(1420)/iota (1460) meson in the decay channels eta$\pi\pi$ and KK-barπ. The BNL data at twice the statistics of the previously published event sample show clearly a J/sup PG/ = 0/sup -+/ $\delta(980)\pi$ state with a phase motion characteristic of a resonance.

48773 **Some advanced accelerator projects and ideas.** Sessler, A. (Lawrence Berkeley Lab., Berkeley, CA 94720). pp 1523-1527 of Proceedings of the XXIII international conference on high energy physics. Loken, S.C. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1987). (CONF-860701—).

From 23. international conference on high-energy physics; Berkeley, CA, USA (16 Jul 1986).

The author discusses projects and ideas represented, as follows: The motivation is to secure high gradients to reduce power to a reasonable amount, and reduce the length as a consequence of the high gradient; a promising solution is offered by a possibility of having a free electron laser in conjunction with induction units resulting in the following steps: A free electron laser (FEL) to generate high peak power (30 GHz, 10 times the frequency at SLAC, so the wave length is one centimeter instead of ten centimeters); translate this radiation to a conventional high gradient accelerator structure, a conventional linac so that it results in stability and all the positive things known about ordinary linacs; this becomes a power source; use induction units to pump up low energy beams and accelerate little bunches of $10^{\prime\prime}$ electrons up to a few hundred GeV; the schematic of such a system is exemplified with a low energy beam which is a kilo-amp of tens of MeVs; between the FEL sections, energy returns with induction units; and wave guides take rf power to a conventional linac structure - a high gradient linac structure.

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REFER ALSO TO CITATION(S) 48557, 48842, 48854, 48854, 48862, 48922, 48966, 49054

48774 **(CEA-N—2479-Rev.1) Survey of research in elementary particle physics.** Baton, J.P.; Cohen-Tannoudji, G. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Physique des Particules Elementaires). Oct 1986. 170p. (In French). NTIS (US Sales Only), PC A08/MF A01. File Number DE87752575.

These notes are devoted to the current trends in elementary particle physics. They are not intended for the training of experts in the field. After a brief historical survey, one discusses the difficulties which have made necessary to move from classical physics to relativistic quantum physics. The main concepts of this new theory are rapidly presented. The experimental methods are discussed within a few typical experiments, already performed or scheduled. The main questions which are still unsolved are rapidly mentioned.

48775 **(DOE/ER/40200—099) Angular distribution of W boson pairs at a heavy Z-resonance.** Nandi, S.; Rizzo, T.G. (Oklahoma State Univ., Stillwater (USA). Dept. of Physics; Texas Univ., Austin (USA). Center for Particle Theory). May 1987. Contract FG05-85ER40215;W-7405-ENG-82;FG05-85ER40200. 15p. (IS-J—2503). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014585.

In theories with an extra U(1) gauge boson (Z_θ) at low energies. W boson pairs may be produced copiously by the process $e^+e^- \rightarrow Z_\theta \rightarrow W^+W^-$ at the Z_θ-resonance. We show that the angular distribution of the W pairs (produced at the Z_θ-resonance) is very different from that in the standard model, at the same center of mass energy, where it is dominated by t-channel neutrino exchange. These distributions will also be useful in distinguishing amcng the various models containing an extra Z-boson.

48776 **(DOE/ER/40200—100) Gluon production of gauge bosons.** Dicus, D.A.; Kao, Chung; Repko, W.W. (Texas Univ., Austin (USA). Center for Particle Theory; Michigan State Univ., East Lansing (USA). Dept. of Physics and Astronomy). Jun 1987. Contract FG05-85ER40200. 11p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014590.

We determine the contribution to $pp \rightarrow ZZ + X$ from gluon gluon $\rightarrow$ ZZ by evaluating the relevant box diagrams.

48777 **(DOE/ER/40200—104) E_6 exotic quark production in ep collisions.** Hewett, J.L. (Texas Univ., Austin (USA). Center for Particle Theory). Jun 1987. Contract FG05-85ER40200. 15p. (IS-J—2501). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014588.

We examine the possibility of producing exotic quarks from E_6 theories via flavor changing couplings in high energy ep collisions at HERA and the proposed LEP x LHC. We find that the rate is rather small and very mixing angle dependent. Assuming maximal mixing, the production rates are $\simeq$10 to 30 events per year at HERA (for masses up to 100 GeV) and $\simeq$200 events per year at LEP x LHC (for masses up to 300 GeV).

48778 **(DOE/ER/40200—114) Research program in elementary particle theory: Progress report, January 1, 1987-December 1987.** Sudarshan, E.C.G.; Dicus, D.A. (Texas Univ., Austin (USA). Center for Particle Theory). Aug 1987. Contract FG05-85ER40200. 89p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000159.

Progress is reported in the areas of: strings and gauge theories, mathematical physics and quantum optics, high energy physics phenomenology, quantum chromodynamic sum rules, and application of particle physics to astrophysics. Titles of DOE reports resulting from this research are listed, and the research histories of the scientific staff of the Center for Particle Theory are given. (LEW)

48779 **(DOE/ER/40252—2) Theoretical studies of phenomenological models of nuclear chromodynamics: Progress report, January 1, 1987-December 31, 1987.** Parmentola, J.A. (West Virginia Univ., Morgantown (USA)). Sep 1987. Contract FG05-86ER40252. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014901.

During the second year of this research program significant progress has been made on the following research problems: (1) in computing nucleon electric form factors and pion-nucleon scattering in our pionic nontopological soliton model; (2) in computing meson-soliton scattering in a topological soliton model in 1 + 1 dimensions; (3) on the completion of a thesis which involved the establishment of a quantitative connection between a free relativistic and free nonrelativistic quantum field theory of scalar bosons.

48780 **(DOE/ER/40272—39) Exotic (E_6) particles in e^+e^- annihilation.** del Aguila, F.; Laermann, E.; Zerwas, P. (Florida Univ., Gainesville (USA). Dept. of Physics). Apr 1987. Contract FG05-86ER40272. 59p. (UFTP—87-11). NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014591.

Fermion mixing is analyzed in (E_6) extensions of the standard model. Cross sections and signatures for the production in present and future e^+e^- colliders are discussed in detail.

48781 **(IFVE-OTF—85-10) Inclusive spectra in hard processes.** Kiselev, A.V.; Petrov, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 7p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703248.

The hadron inclusive spectrum in deep inelastic lepton-hadron scattering is calculated. By comparing it with the analogous distribution in e/sup +/e/sup -/-annihilation, it is concluded that the inclusive spectrum of soft hadrons is described in hard processes by the universal function. 9 refs.

48782 **(IFVE-OTF—85-68) Description of the total cross sections rise in the gluon dominance model.** Dzhaparidze, G.Sh.; Yushchenko, O.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702904.

Proceeding from the gluon dominance model, a simple scheme to describe the increase of total cross sections is proposed. This increase is described by the quantities characterising the quark-gluon structure of a hadron, namely, by the valence quark number and the momentum fraction of a hadron carried by partons. The present scheme allows one to obtain the numerical relations for the growing parts of σ/sub tot/ for various particles. 22 refs.; 1 fig.; 2 tabs.

48783 **(IFVE-OTF—85-113) Possibility to test the excited quark hypothesis and define the quark quantum numbers.** Gershtejn, S.S.; Jickia, G.V.; Pirogov, Yu.F. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 26p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703249.

Submitted to the journal Sov. J. Nucl. Phys. .

In the framework of the hypothesis of an excited quark of spin 1/2 or 3/2, a systematic study is given to the exotic events at Spp-barS collider with a large missing transverse momentum and a hard jet (or several jets) accompanied or not by a charged lepton. The helicity production and decay amplitudes of the excited quark and the corresponding most general effective Lagrangians is analyzed. The jet angular distributions, transverse spectra of the missing momentum and charged leptons, as well as two- and three-particle correlations have been calculated. With aim to establish the existence of a heavy object, responcible for the exotic events, the investigation of its nature and the properties, the general procedure for analyzing the experimental data are considered. 22 refs.; 6 figs.

48784 **(IFVE-OTF—85-122) Theoretical group nature of an impact parameter and elastic scattering of hadrons.** Vall, A.N. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703250.

The impact parameter group has been obtained and studied on the basis of classical expressions for the vector components of minimum distance between two free spinless particles. The matrix elements of the main continuous unitary series have been calculated, they are quite a natural basis for elastic amplitude expansion. The final dimensional nonunitary series of the SO(2.1) group is shown to be able to describe scattering processes with impact parameter conservation. The corresponding elastic amplitude has been calculated and studied. 12 refs.

48785 **(IFVE-OTF—85-170) String model of hadrons and their interactions.** Borodulin, V.I.; Pron'ko, G.P.; Razumov, A.V.; Soloviev, L.D.; Zorin, O.L. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 16p. (CONF-850721—28). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703251.

From International Europhysics conference on high energy physics; Bari, Italy (18 Jul 1985).

Submitted to the International conference on high energy physics, Bari, Italy, Jul 18-24, 1985.

The present work studies the model of mesons belonging to the leading Regge trajectories. The model is based on the theory of the straight-line string. The quantum theory of such a string and its second quantization have been constructed. Account of massive quarks with a spin and flavour permits to elaborate the model so that the comparison with experiment will be possible. 5 refs.; 3 figs.; 2 tabs.

48786 **(IFVE-OTF—85-180) Gluonic structure and strong interactions of hadrons at high energies.** Kiselev, A.V.; Petrov, V.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 11p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703252.

Submitted to the journal Yad. Fiz. .

Observable consequences of the gluon dominance hypothesis for very high energy collisions of hadrons are presented. Possible relation of the Pomeranchuk trajectory to glueballs is discussed. 17 refs.

48787 **(IFVE-OTF—86-50) Model for dynamical chiral symmetry breaking and quark condensate.** Nekrasov, M.L.; Rochev, V.E. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 9p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703254.

Submitted to the journal Theor. Math. Phys. .

In the framework of the model, proposed earlier to describe nonperturbative QCD, the singularity of the type 1/k/sup 4/ in the gluon propagator is shown to result in dynamical chiral symmetry breaking and appearance of quark condensate. The value, obtained for quark condensate, is close to the phenomenological one. 12 refs.

48788 **(IFVE-OTF—86-89) Inverse scattering method and one-zone approximation in relativistic string theory.** Pron'ko, G.P.; Razumov, A.V.; Solov'ev, L.D. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 14p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703255.

Consistent quantization of a relativistic string in four-dimensional space-time has been considered in the framework of the inverse scattering method. A one-zone (straightline) approximation and its application for the description of meson decay are discussed. 13 refs.

48789 **(IFVE-OTF—86-99) Effective way of reconstructing structure functions on their moments.** Batunin, A.V.; Kartvelishvili, V.G. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 13p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703256.

To improve significantly the accuracy is proposed to reconstruct the structure functions not using the first, second and subsequent moments, but the specially chosen moment set. On the basis of the computered structure functions the calculations of the parton luminosity, heavy quark and lepton pair production, W/sup +-/- and Z/sup 0/-boson and higgs-boson productions are made in pp- and p-barp-interactions for the expected UNK energies. 10 refs.; 6 figs.; 2 tabs.

48790 **(IFVE-OTF—86-100) Comparison of hadron multiplicities in gluon and quark jets.** Dzhaparidze, G.Sh. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 4p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703257.

The ratio r of hadron multiplicities in gluon and quark jets is considered. The asymptotic value r=9/4 is shown to decrease due to heavy quark-effects. The estimation of r following from perturbative QCD, explains the PEP data. 7 refs.

48791 **(IFVE-OTF—86-123) Infrared asymptotics of gluonic Green functions in covariant gauge.** Arbuzov, B.A.; Boos, Eh.Eh.; Davydychev, A.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703258.

Submitted to the journal Theor. Math. Phys. .

The problem of compatibility of singular infrared asymptotics of the gluon propagator D(k) — M/sup 2//k/sup 4/ and the corresponding gluonic vertices and Schwinger-Dyson equations in the covariant gauge is studied. For asymptotics under discussion the most infrared singular two-loop terms are evaluated. The particular covariant gauge is shown to exist in which the selfconsistent description in the infrared region of the lower gluonic and gost Green functions is realized. 17 refs.

48792 **(IFVE-OTF—86-152) Meson mass spectrum in generalized quark field model.** Khrushchev, V.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 8p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703260.

Submitted to the journal Sov. J. Nucl. Phys. .

A hadron model with independent constituents, described by bilocal fields is considered. Equations describing the biological field with values belonging to Grassmann algebra are proposed. In the "instanteneous interaction" approximation mass formulae for light mesons and the spectrum of radially excited states for π, rho, K- and K*-mesons have been obtained. 9 refs.; 1 tab.

48793 **(IFVE-OTF—86-153) On account for contribution from anomalous Zγll interaction in e/sup +/e/sup -/ -> $\nu\nu$-barγ process.** Komachenko, Yu.Ya.; Larin, V.N.; Tikhonin, F.F. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 5p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703261.

A contribution from anomalous Zγll interaction in e/sup +/ e/sup -/ -> $\nu\nu$-bar γ process has been considered. It is shown that at high energies such an interaction will make up a considerable background for exPeriments on determining the number of neutrino types. 16 refs.

48794 (INIS-SU—409, pp 26-29) **On properties of the third pseudoscalar isosinglet.** Efrosinin, V.P.; Zaikin, D.A. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780002.

Kratkie Soobshcheniya po Fizike.; (no.10).

In Experimental and theoretical physics. Collection.

The mass range for possible detection of the ground state of the third O/sup -/ isosinglet eta" is determined. The situation with the description of electromagnetic decays of pseudoscalar isosinglets is discussed. 14 refs.; 2 figs.; 2 tabs.

48795 (INIS-SU—409, pp 30-32) **Off-mass-shell behaviour of πN amplitude and parameters of pion-nuclear optical potential.** Efrosinin, V.P.; Zaikin, D.A.; Osipchuk, I.I. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780002.

Kratkie Soobshcheniya po Fizike.; (no.10).

In Experimental and theoretical physics. Collection.

The calculation of two-nucleon parameters of s-wave part of pion-nuclear optical potential is performed. The importance of taking into account the off-mass behaviour of πN-amplitude in this calculation is stressed. 11 refs.; 2 figs.; 1 tab.

48796 (INIS-SU—413, pp 39-43) **Pions polarizability and H(1190) meson.** L'vov, A.I.; Petrun'kin, V.A. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780003.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

Saturation of sum rules (SR) for α/sub π/ and β/sub π/ pion polarizabilities is performed. It is shown, that the account of H

meson with the width G/sub H->$\gamma\pi$/ — 2 MeV eliminates divergence between SR and chiral model predictions. The found values $(\alpha+\beta)$/sub π(sup +-)/ — 0.03; $(\alpha+\beta)$/sub π(sup 0)/ — 1.3; α/sub π(sup +-)/ — 5 (in 10/sup -43/ cm/sup 3/ units) agree with the experimental data. 20 refs.; 1 tab.

48797 (INIS-SU—413, pp 54-57) **Gluonium and Regge trajectories from the Klein-Gordon equation.** Bykov, A.A.; Mironov, A.D.; Rojzen, I.I. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780003.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

Pomeron trajectory and vector meson trajectory type in the time-like region is found within the framework of the approach, taking account of the relativistic kinematics. The reason for the qualitative difference of their properties under low energies is discovered and assessment of masses and dimensions of tensor gluonium and light vector mesons is made. 7 refs.; 1 fig.

48798 (INIS-SU—415, pp 5-17) **Unique algorithm for calculation of inclusive cross sections of particle production with big transverse momenta and of cumulative type hadrons.** Stavinskij, V.S. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178. (N—18-86).

In JINR rapid communications. Collection.

Unique algorithm is proposed for calculating inclusive cross sections of particle production with big transverse momenta and cumulative type hadrons. A possibility of unique description of these processes is due to introduction of a new argument - of minimal energy of colliding constituents needed for the production of observed particle. 26 refs.; 3 figs.; 2 tabs.

48799 (INIS-SU—416, pp 19-26) **Description of multiple processes on the basis of triangulation in the velocity space.** Baldin, A.M.; Baldin, A.A. (Joint Inst. for Nuclear Research, Dubna, USSR. Lab. of High Energy; AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179. (N—17-86).

In JINR rapid communications. Collection.

A method of the construction of polyhedrons in the relative four-velocity space is suggested which gives a complete description of multiple processes. A method of the consideration of a general case, when the total number of the relative velocity variables exceeds the number of the degrees of freedom, is also given. The account of the particular features of the polyhedrons due to the clusterization in the velocity space, as well as the account of the existence of intermediate asymptotics and the correlation depletion principle makes it possible to propose an algorithm for processing much larger bulk of experimental information on multiple processes as compared to the inclusive approach. 7 refs.; 1 tab.

48800 (INIS-SU—416, pp 27-31) **Decay of K/sub S//sup 0/ -> $\gamma\gamma$ in the chiral theory.** Bel'kov, A.A.; Kalinovskij, Yu.L.; Pervushin, V.N. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij; Gomel'skij Politekhnicheskij Inst., Byelorussian SSR; Joint Inst. for Nuclear Research, Dubna, USSR. Lab. of Theoretical Physics). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179. (N—17-86).

In JINR rapid communications. Collection.

The decay of K/sub S//sup 0/ -> $\gamma\gamma$ is considered in the framework of the chiral theory. The Lagrangian of weak interaction stricktly satisfies the rule $\Delta T=1/2$ and has the current form. The meson currents are a nonlinear realization of SU(3)xSU(3) - chiral symmetry. No additional phenomenological parameter is needed to take into account the mechanism of K/sub S//sup 0/ -> {2K, 2π} -> $\gamma\gamma$. Estimation of the decay branching ratio is found W(K/sub S//sup 0/ -> $\gamma\gamma$)/W(K/sub S//sup 0/ -> all)=7.9x10/sup -7/; W(K/sub L//sup 0/ -> $\gamma\gamma$)/W(K/sub S//sup 0/ -> $\gamma\gamma$)=8.3. 16 refs.; 4 figs.

48801 (INIS-SU—417, pp 54-57) **Model of a chiral phase transition in QCD/sub 4/.** Kalashnikov, O.K. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

Nonperturbed solution of Schwinger-Dyson equation describing chiral phase transition in QCD/sub 4/ is preseneted. Anomaly in the temperature (T) behaviour of the quark dynamic mass is determined and its parameters are numerically calculated. A closed for all T approximation for effective charge is suggested. 9 refs.; 1 fig.

48802 (INIS-SU—417, pp 28-29) **New type of supersymmetric theories.** Konshtejn, S.E.; Fradkin, E.S. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

A new type of supersymmetric theories is discussed. In supersymmetric theories with finite gauge and some Yukawa coupling constants not logarithmic but degree hierarchy between other Yukawa constants takes place. Construction of a grand unified supersymmetric model with reduced chiral supermultiplet, in which fermion mass hierarchy in different supermultiplet irreduced parts results from the above-mentioned mechanism, is suggested. 7 refs.

48803 (INIS-SU—418, pp 25-28) **On the asymptotics of arbitrary-angle scattering amplitudes of scalar particles.** Gadzhiev, S.A.; Dzhafarov, R.K. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

In Plasma physics. Collection.

Asymptotics of solving Bethe-Salpeter equation for imaginary part of arbitrary-angle scattering amplitude of scalar particles in Regge region is studied. 7 refs.

48804 (INIS-SU—419, pp 19-21) **Mixing of radial excitations of pseudoscalar isosinglets and possible nature of eta(1275) and iota(1440).** Efrosinin, V.P.; Zaikin, D.A. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780005.

Kratkie Soobshcheniya po Fizike.; (no.8).

In Experimental and theoretical physics. Collection.

Mixing of radical excitations of pseudoscalar isosinglets with n=2 is investigated. The ideal charater of their mixing in contrast to mixing in ground state is shown. The results presented testify in favour of interpretation of the first radial excitations of pseudoscalar isosinglets according to which eta(1275) is (n=2)-combination state of nonstrange quarks (u-baru+d-bard) $\sqrt{}$ with slight impurities s-bars and gg, whereas i (1440) represents practically completely the two-gluon state with n=2. The third isosinglet state with n=2 is s (1700)-meson consisting of a pair of strange quark and antiquark. 9 refs.

48805 (INS—573) **Present status of composite models in particle physics. Minimal composite model of 'elementary' particles and fields.** Terazawa, Hidezumi. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Mar 1986. 10p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702913.

The present status of composite models in particle physics is reviewed with emphasis on the minimal composite model. The subjects to discuss include 1) minimal composite model, 2) generations, 3) mass spectrum and 4) Miyazawa's SUSY and Nambu's SUSY.

48806 (INS—581) **Repetition of the quark-lepton states in a supersymmetric composite model with complementarity.** Yamada, Hirofumi; Yasue, Masaki. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Apr 1986. 17p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702915.

In a supersymmetric composite model based on an SU(4)/sub sc//sup loc/ confining theory, complementarity is used to support the symmetry-breaking pattern and spectrum of massless particles in a confining phase. The model is found to accommodate two generations of quarks and leptons as quasi Nambu-Goldstone fermions and another two generations as chiral fermions. Masses of composite particles are examined and the quark-lepton generations

are classified according to possible mass splittings. The suppression of dangerous flavor-changing interactions is also considered.

48807 **(INS—594) Dynamical aspects of supersymmetric composite models of quarks and leptons.** Yasue, Masaki. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jul 1986. 6p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702919.

Chiral symmetry breakings and spectrum of light composite particles including quarks and leptons are discussed in supersymmetric confining theories based on SU(N)/sub sc//sup loc/ with M-flavors for N ≦ M and with an extra antisymmetric 6/sub sc/ field for N = 4.

48808 **(INS—597) Symmetry breaking by Wilson loops and mass quantization.** Midorikawa, Shoichi; Tomiya, Mitsuyoshi. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jul 1986. 11p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702922.

Gauge symmetry breaking by the twisted boundary conditions is studied in a simple model. It is shown that these conditions can be obtained from singular gauge transformations on the vacuum and that the masses of vector bosons associated with the symmetry breaking is quantized due to the singular gauge transformations.

48809 **(INS—601) Relation between the masses of the first and second generations of quarks in a minimal composite model.** Terazawa, H. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Aug 1986. 6p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702924.

A specific picture in a minimal composite model for the generation of quarks in which quarks are two- and four-body composites in the first and second generation leads to the mass relation of m/sub c//m/sub s/ = (4 m/sub d/ - m/sub u/)/(4 m/sub u/ - m/sub d/), which may explain the largeness of m/sub c//m/sub s/.

48810 **(INS—602) Square-root sum rule for quark and lepton masses in a minimal composite model.** Terazawa, H. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Aug 1986. 10p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702925.

It is pointed out that the masses of quarks and leptons in the first generation may satisfy the square-root sum rule of m/sub e//sup 1/2/ - m/sub ν(sub e)//sup 1/2/ = m/sub d//sup 1/2/ - m/sub u//sup 1/2/, which suggests the quadratic form of Hamiltonian in "hypercharges" and the additivity of "hypercharges" in a minimal composite model of quarks and leptons.

48811 **(INS—603) Monopoles as probes for extra dimensions.** Midorikawa, Shoichi; Tomiya, Mitsuyoshi. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Aug 1986. 9p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702926.

The non-Abelian magnetic monopoles associated with symmetry breaking by the compactification of extra dimensions is considered. It is shown that the compactified space blows up inside the monopoles. It is also shown that the spherically symmetric singularity-free monopole (dyon) solutions put stringent constraints on the twisted boundary conditions of fermion fields.

48812 **(INS—607) Do quarks play an explicit role as nuclear constituents?.** Yamazaki, Toshimitsu. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Oct 1986. 19p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702930.

Experimental signatures for explicit roles of quarks as nuclear constituents are looked for. It is stressed that hyperons in nuclei may reveal unique information on nuclear interior and possible quark deconfinement. Future directions of hypernuclear spectroscopy are discussed.

48813 **(ITEF—44-1985) Low-energy supergravity and a light t quark.** Veselov, A.I.; Vysotskij, M.I.; Ter-Martirosyan, K.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 29p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703272.

A simple method to construct a model of grand unification, which solves the problem of hierarchy in spontaneously violated supergravity is suggested. The N=1 supergravity has a great disadvantage since effective lagrangian L/sub eff/, describing the whole low-energy spectrum of new particles in the observable range E — M/sub W/, proved to depend on several parameters: m/sub 3/2/, γ, A, B and on the mass of the Higgs bosons. They are conditioned by the range of high energies E — M/sub p/ and are not known either theoretically or experimentally. Therefore, these parameters are considered to be assigned at E — M/sub x/, and renormgroup equations are used to determine all the coefficients in L/sub eff/ on the particle mass shell at E — 10/sup 2/ GeV. Thus, it is possible to "calculate" only conventionally the masses of new particles (i.e. of all supersymmetric partners of conventional particles): quarkino, gluino, leptino and Higgsino-Wiggsino (i.e. Z- and W-bozino) - i.e. to obtain their values for a certain range of values of four abovementioned parameters. The selected range $\mu' << m/sub 3/2/$ in the sector of leptino-quarkino scalar neutrino ν-tilde/sub tau,μ,e/ proved to be the lightest ones, and neutral Higgsino H-tilde/sub 0/ with masses of several GeV - the lightest ones among fermions. This particle is stable and it must be present among new particles decay products. 16 refs.; 3 tabs.

48814 **(ITEF—106-1986) A-dependence of conversed particles in high energy hadron-nucleus interactions.** Sibirtsev, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 14p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703282.

The A-dependence of conservated particles in high energy hadron-nucleus collisions is discussed in the framework of analytical solution of hadron evolution process equation. A-dependence was shown is significantly differ from A/sup 1/3/ usually expected by propagation of conservated particles through the nucleus tube. It was also shown that the cross section of hadron-nuclear nucleon interaction is about 3 times less than the hadron-free nucleon interaction one. 3 refs.; 6 figs.

48815 **(ITEF—119-1985) Angular correlations of particles produced in the π/sup -/p->K/sup 0/π/sup +-/ +X, π/sup -/p->K/sup 0/K/sup 0/-bar+X, π/sup -/p->K/sup 0/Λ+X reactions at 4.5 GeV/c momentum.** Arutyunyants, G.A.; Kiselevich, I.L.; Kulakov, V.P.; Mel'nichenko, I.A.; Silaev, V.I.; Shidlovskij, A.V.; Shkarpet, V.D. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703284.

Angular distributions among transverse momenta of secondary particles as well as angular correlations in the Gottfred-Jackson system of π/sup -/p -> K/sup 0/π/sup +-/ + X, π/sup -/p -> K/sup 0/K-bar/sup 0/ + X, π/sup -/p -> K/sup 0/Λ + X reactions at 4.5 GeV/c momentum have been investigated. 5 refs.; 6 figs.; 1 tab.

48816 **(ITEP—68-1985) On two-photon width of σ-meson.** Shabalin, E.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 7p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703306.

It is shown that a natural magnitude of the radiative width of the δ meson must be Γ/sub δγγ/ — 1 keV. The reason for which the published experimental number for Γ/sub δγγ/ seems to be too low is presented. 10 refs.; 2 figs.

48817 (ITEP—71-1985) Form factor πrhoγ in perturbative QCD. Gorskij, A.S. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 17p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702944.

Contribution from the hard scattering mechanism to πrhoγ form factor has been obtained. The calculation at all stages were performed with gauge invariant objects only and the large cancellations between two- and three particle contributions are absent in the final result. Equations of motion which connect the moments of twist 3 wave functions have been found. An algorithm of construction the solution of these equations, which also allows one to find asymptotic wave functions has been suggested. 14 refs.; 5 figs.

48818 (ITEP—112-1986) Self-energy operator of the d-s transition and the K/sub s/ -> 2π decays. Shabalin, E.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 16p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703308.

The regularized self-energy operator of the d-s transition Σ/sub Reg//sup ds/ calculated with gluon loop corrections taken into account has a value by α/sub S/M/sub W//sup 2//(πm/sub q//sup 2/) times larger than it has in the one-loop approximation. Using a method of evaluation permissing to express the amplitude a/sub 1/2/ of K/sub S/ -> 2π decay in terms of Σ/sub Reg//sup ds/ a value of a/sub 1/2//sup th/ practically coinsiding with the experimental one are obtained. 17 refs.; 6 figs.

48819 (ITEP—142-1986) What can we know about nature of the resonance σ(980) from the data on σ production in $\gamma\gamma$ collisions. Shabalin, E.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 12p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703310.

If a true width of the resonance δ is large, as it is usual for δ in the qq-bar and q/sup 2/q-bar/sup 2/ models, the data on the process $\gamma\gamma$ -> δ -> etaπ testify to preferance of the magnitude of width Γ/sub $\delta\gamma\gamma$/(M/sub δ/) — 1.3 KeV predicted by qq-bar model as compared with a value Γ/sub δ/γ/sub γ/(M/sub δ/) << 1 KeV predicted in the framework of the q/sup 2/q-bar/sup 2/ model. 18 refs.; 3 figs.

48820 (ITEP—164-1986) Dibaryon resonance 2.9 GeV in elastic backward π/sup -/d scattering. Chuvilo, I.V.; Kondratyuk, L.A.; Radkevich, I.A.; Ralchenko, Yu.V.; Vasilets, A.V.; Shevchenko, L.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 16p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703311.

It is shown that the structure in the elastic backward π/sup -/d-scattering found by ITEP group is due to the manifestation of the dibaryon resonance (DB) with the mass of 2.9 GeV. The partial widths X/sub πd/ and X/sub pp/ are defined from the joint analysis of these and other data. It is shown that it is impossible to describe the prominent peak in the reaction pp -> dπ/sup +/ in the framework of OPE model. The structure of DB(2.9) in the MIT bag model is discussed. 25 refs.; 5 figs.

48821 (ITEP—179-1985) Elastic pp scattering in the Coulomb-nuclear interference region and low energy behaviour of p-barp scattering partial amplitudes. Kudryavtsev, A.E.; Markushin, V.E. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 14p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703312.

The experimental data on the low energy elastic p-barp scattering in the Coulomb-nuclear interference region and on the shift and width of the 1s level of p-barp-atom are analysed. The partial wave amplitudes for l=0.1 are extracted. The p-wave amplitude is in fair agreement with the atomic data for the 2p state and exhibits some energy structure. It is shown that the real-to-imaginary ratio of the p-barp forward elastic-scattering amplitude becomes negative in an energy interval just near p-barp-threshold. 14 refs.; 3 figs.

48822 (JINR—D-4-85-851, pp 295-303) Nucleon-nucleon interaction and the quark model. Faessler, A. (Tuebingen Univ., Germany, F.R. Inst. fuer Theoretische Physik). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The NN phase shifts are calculated using the quark model with a QCD inspired quark-quark force. The short range part of the NN force is given by quark and gluon exchange. The long range part is described by π and σ-meson exchange. The data fitted in the model are five values connected with three quarks only: the nucleon mass, the Δ mass, the root mean square radius of the charge distribution of the proton including the pion cloud, the π-N and the σ-N coupling constant at zero momentum transfer. The /sub 1/S and /sub 3/S phase shifts are nicely reproduced. The short range repulsion is decisively influenced by the node in the [42]/sub r/ relative wave function. Very important is the colour magnetic quark-quark force which enlarges the [42]/sub r/ admixture. In the OBEP's the short range repulsion is connected with the exchange of the ω-meson. But to reproduce the short range repulsion one had to blow up the ω-N coupling constant by a factor 2 to 3 compared to flavour SU/sub 3/. With quark and gluon exchange the best fit to the ω-N coupling constant lies close to the SU/sub 3/ flavour value. This fact strongly supports the notion that the real nature of the short range repulsion of the NN interaction have been found. 17 refs.; 8 figs.

48823 (JINR-E—2-86-715) Correction to deep inelastic scattering cross section ratio R=σ/sub L//σ/sub T/ in QCD. Kazakov, D.I.; Kotikov, A.V. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 10p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703316.

Submitted to the journal Sov. J. Nucl. Phys.

The α/sub S/ correction to the longitudinal structure function of deep inelastic scattering is calculated within QCD. It is applied to the determination of R=σ/sub L//σ/sub T/ in the framework of scheme-invariant perturbation theory. The account of nonleading contribution improves the agreement with experimental data. 14 references, 2 figures.

48824 (KFTI—86-19) Electroproduction of neutral pions on deuterons. Rekalo, M.P. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 9p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703330.

For a process of electroproduction of neutral pions on deuterons $e^- + d \to e^- + \pi^0 + d$ the polarization phenomena are studied. It is estimated the general dependence on azimuthal angle phi electron scattering and κ-parameter of linear polarization of virtual photon in $\gamma^* + d \to d + \pi^0$ reaction (in of one-photon mechanism validity) for the electron angular distribution asumption symmetries due to vector and tenzor polarization of deuteron target. phi- and κ dependence of different contributions into vector polarization of final deuterons is estimated under the scattering of non-polarized and longitudinal polarized electrons on non-polarized target. The analysis is given in the terms of structure functions of the $e^- + d \to e^- + \pi^0 + d$ under the condition when in the final state two particles are registrated: electron and deuteron. The expressions for structure function are obtained in the terms of 13 scalar amplitudes of the $\gamma^* + d \to d + \pi^0$ process. The analysis of the polarized phenomena near threshold is rather simplified at near the threshold of $\gamma^* + d \to d + \pi^0$ process, its amplitude is defined only by three real threshold formfactors. 29 references.

48825 (LA-UR—87-2464, pp 4.1-4.24) Weak interaction matrix elements on the lattice. 1987. NTIS, PC A08/MF A01. File Number DE87013164. (CONF-8705129—2). Contract W-7405-ENG-36.

From Workshop on lattice gauge theory using parallel processors; Beijing, China (21 May 1987).

The pseudoscalar octet is the key to our understanding a significant fraction of modern particle physics. The light pion is a manifestation of a nearly exact chiral symmetry. The kaons are a periscope to the unknown world of CP violation. How well we can explain the large enhancement of $\Delta I = 1/2$ amplitude in K decays reflects our ability to calculate strong interaction corrections to any process involving low energy gluons. In all these phenomenon, the Achilles' heel is our inability to calculate the non-leptonic matrix elements at the hadronic scale. Once the machinery to calculate matrix elements (ME) on the lattice is established, the list of problems one can address is large. As an example, only the $\Delta I = 1/2$ rule and ϵ'/ϵ is discussed in this paper.

48826 **(LAL—86-43) Experimental search of gluonic mesons.** Couchot, F. (Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire). Dec 1986. 40p. (In French). (CONF-8609297—1). NTIS (US Sales Only), PC A03/MF A01. File Number DE87752586.

From 18. summer school on particle physics; Gif-sur-Yvette, France (8 Sep 1986).

The decays of the J/PSI have an important part in the experimental research of glueballs. This report presents the results of several experiments after a theoretical approach about glueballs.

48827 **(LBL—23645) Excited quark production at hadron colliders.** Baur, U.; Hinchliffe, I.; Zeppenfeld, D. (Fermi National Accelerator Lab., Batavia, IL (USA); Lawrence Berkeley Lab., CA (USA); Wisconsin Univ., Madison (USA). Dept. of Physics). Jun 1987. Contract AC03-76SF00098. 9p. (CONF-8705163—7). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000211.

From From colliders to supercolliders workshop; Madison, WI, USA (11 May 1987).

Composite models generally predict the existence of excited quark and lepton states. We consider the production and experimental signatures of excited quarks Q* of spin and isospin 1/2 at hadron colliders and estimate the background for those channels which are most promising for Q* identification. Multi-TeV pp-colliders will give access to such particles with masses up to several TeV.

48828 **(OUP—87-15) On the s->d self energy transition —α/sub s/ G/sub F/ and the relevance for the ΔI=1/2 and ε'/ε puzzles.** Eeg, J.O. (Oslo Univ. (Norway). Fysisk Inst.). May 1987. 10p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752525.

The s->d self energy transitions diagrams —α/sub s/G/sub F/ or /sup s/elf-penguins/sup ,/ recently proposed by Shabalin as the explanation of the $\Delta I=1/2$ rule for $K->\pi\pi$ decays, have been considered. The effect of such self-energy transition on physical amplitudes is considered in terms of a chiral quark loop model for $K->\pi$. A self-penguin contribution proportional to the dot product of the pion and kaon four momenta is found. However, this contribution can at most account for 5% of the observed $\Delta I=1/2$ amplitude. The self-penguin contribution to the CP-violating quantity ϵ'/ϵ calculated within the same framework could be as big as half of the standard penguin contribution. 20 refs.

48829 **(SLAC-PUB—4334) Searching for 4th generation fermions at high-energy e^+e^- machines.** Dorfan, J.; Van Kooten, R.J. (Stanford Linear Accelerator Center, Menlo Park, CA (USA)). May 1987. Contract AC03-76SF00515. 10p. (CONF-870278—6). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014311.

From 4. family of quarks and leptons international symposium; Santa Monica, CA, USA (26 Feb 1987).

This writeup summarizes Monte Carlo studies on the feasibility of searching for 4th family fermions at high energy e^+e^- machines. By high energy it is meant at energies beyond the Z^0; the Z^0 searches having been studied extensively by the SLC and LEP collaborations. The specific examples of $\sqrt{s} = 200$ GeV (namely LEP200) and $\sqrt{s} = 600$ GeV (in line with work being done at SLAC to investigate the potential of a future linear collider) were chosen. The studies have been performed with the four vectors produced by the models and no attempt has been made to account for the effects of finite resolution and inefficiencies due to a real detector environment.

48830 **(SLAC-PUB—4361) J/psi and Y radiative and hadronic decays.** Bloom, E.D. (Stanford Linear Accelerator Center, Menlo Park, CA (USA)). Jul 1987. Contract AC03-76SF00515. 20p. (CONF-870334—3). NTIS, PC A02. File Number DE87014313.

From Workshop on results and perspectives in particle physics; La Thuile, Italy (1 Mar 1987).

The search for gluonium at the J/psi and Y is discussed, as well as the search for exotics at the Y. Reactions discussed include radiative and hadronic decays of the J/psi and the search for radiative decays of the Y. Future perspectives are also briefly considered. 45 refs., 27 figs. (LEW)

48831 **B decays without final-state charm particles and CP noninvariance.** Chau, L.; Cheng, H. (Physics Department, University of California at Davis, Davis, California 95616). *Physical Review Letters;* **59**: No. 9, 958-961(31 Aug 1987).

Branching ratios and CP noninvariance of nonleptonic rare exclusive B decays without charm particles in the final state are studied. Decay channels, such as B/sub d/^{0}→K^{0}phi,K/sup */^{0}phi, B/sub s/^{0}→K-bar^{0}phi,K-bar/sup */^{0}phi, B/sub d//sub ,//sub s/→phiphi,K^{0}K-bar^0,K/sup */^{0} K-bar^0,K^{0}K-bar/sup */^{0},K/sup */^{0}K-bar/sup */^{0}, etc., that can give direct evidence for the W-loop diagrams are pointed out. Some decay modes have large (tens of percent) CP noninvariance of partial-decay-rate differences. Decays such as B/sub u/$^+$→K$^+$ rho^0, $K^+\pi^+\pi^-$,K$^+$ phi,K$^+$K$^+$K$^-$ might be of special interest because of the simplicity in the origin of their CP noninvariance and in their experimental detectability.

48832 **ε'/ε from the lattice.** Sharpe, S.R.; Gupta, R.; Guralnik, G.; Patel, A.; Kilcup, G.W. (Stanford Linear Accelerator Center, CA, USA; Los Alamos National Lab., LANL, NM, USA. Theoretical Div.; Brown Univ., Providence, RI, USA. Dept. of Physics; Cornell Univ., Ithaca, NY, USA. Newman Lab. of Physics). *Physics Letters* [*Section*] *B;* **192**: No. 1/2, 149-155(25 Jun 1987). Contract AC03-76SF00515;AC02-76ER03130.

Results from a lattice calculation of the matrix elements of the weak hamiltonian which determine ϵ' are presented. They suggest a smaller value of ϵ'/ϵ than previously estimated.

48833 **(p, n) reaction and the nucleon-nucleon force.** Bertsch, G.F.; Esbensen, H. (Michigan State Univ., East Lansing, USA. Cyclotron Lab.; Michigan State Univ., East Lansing, USA. Dept. of Physics and Astronomy; Argonne National Lab., IL, USA). *Reports on Progress in Physics;* **50**: No. 6, 607-654(Jun 1987).

The (p, n) charge exchange reaction is a powerful tool of nuclear structure physics, with spectroscopic characteristics that are closely related to the free interaction between nucleons. At proton energies in the range of 150-500 MeV, the interaction probes the spin dynamics in the charge exchange process and is particularly sensitive to nuclear pionic fields. At low energies, say less than 50 MeV bombarding energy, the reaction also probes the isovector density. An outstanding success of the reaction as a structural probe is the elucidation of the Gamow-Teller strength function in the nuclear excitation spectrum. However, the total strength found falls short of sum rule predictions by about 40%. Explanations of this quenching have been advanced along two lines, based on subnuclear degrees of freedom or on configuration mixing into high continuum states. Detailed theoretical arguments support the importance of configuration mixing. The subnuclear degrees of freedom may be comparable, but a decisive test is lacking.

48834 **Neutrino mass and the solar neutrino problem.** Wolfenstein, L. (Carnegie-Mellon Univ., Physics Dept., Pittsburgh, PA 15213). pp 893-896 of Proceedings of the XXIII international conference on high energy physics. Loken, S.C. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1987). (CONF-860701—).

From 23. international conference on high-energy physics; Berkeley, CA, USA (16 Jul 1986).

Theoretical ideas about neutrino mass based on grand-unified theories are reviewed. These give the see-saw formula in which

neutrino mass is inversely proportional to a large mass scale M. For M between 10/sup 11/ and 10/sup 15/ Gev the study of solar neutrinos appears to be the best probe of neutrino masses and mixings.

48835 **Polarization effects in hadron structure functions and in quark and gluon fragmentation.** Einhorn, M.B. (Randall Laboratory of Physics, University of Michigan, Ann Arbor, Michigan 48109-1120). *AIP (American Institute of Physics) Conference Proceedings;* **145**: No. 1, 149-153(20 Jul 1986). (CONF-8504161—).

From Workshop on polarized antiproton sources; Bodega Bay, CA, USA (18 Apr 1985).

The predictions of QCD for the evolution of the quark and gluon structure functions of a polarized proton are discussed. In fact, the parton polarizations increase with energy, for fixed Feynman x. Thus, polarized protons may be useful for the discovery or investigation of new physical phenomena at very high energy, especially if there are new interactions or particles whose behavior violates one of the natural symmetries of QCD, such as parity. The mean gluon asymmetry grows as l-scriptnQ², which implies that the orbital angular momentum of the gluons grows similarly.

48836 **Better potential for quarks.** Heller, L. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 72-82(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

It is argued on theoretical and phenomenological grounds that confinement of quarks is intrinsically a many-body interaction. The Born-Oppenheimer approximation to the bag model is shown to give rise to a static potential energy that consists of a sum of two-body Coulomb terms and a many-body confining term. Following the success of this potential in heavy QQ-bar systems it is being applied to Q²Q-bar². Preliminary calculations suggest that a dimeson bound state may exist.

48837 **Charge form factors and quark clusters.** Vary, J.P.; Coon, S.A.; Pirner, H.J. (Iowa State University, Ames, IA 50011). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 83-95(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

We present a model for nuclear charge form factors based on the quark cluster model. Different approximation schemes are presented and compared with each other and with the conventional nuclear physics approach in the important three nucleon system. One basic result stands out: the presence of six-quark clusters in the A = 3 system brings the calculated charge form factor much closer to agreement with experiment. The physical origins of the effects due to higher clusters are presented.

6453 Particle Invariance Principles And Symmetries

REFER ALSO TO CITATION(S) 48808, 48831, 48835

48838 (INIS-SU—410, pp 31-34) **Clebsch-Gordan coefficients for symmetric representations of symplectic groups.** Shelepin, A.L. 1986. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87780176.

Kratkie Soobshcheniya po Fizike.; (no.9).

In Experimental and theoretical physics. Collection.

Method of generating invariants for symplectic groups is formulated. The Clebsch-Gordan coefficients for coupling of symmetric representations D(PO..., O) of groups Sp(2N) were calculated and their symmetry properties were obtained. 8 refs.

48839 (INIS-SU—416, pp 32-35) **On a realization of the exceptional algebras E/sub 6/ and E/sub 8/.** Nguyen Van Hieu; Nguyen Hung Son. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179. (N—17-86).

In JINR rapid communications. Collection.

The exceptional Lie algebras E/sub 6/ and E/sub 8/ are realized in terms of the covariant operators transformed as scalars, spinors, vectors and an antisymmetric tensor under the subalgebra SO(10). All commutation relations are given explicity. 3 refs.

48840 **(INS—589) Symmetry breakings in supersymmetric quantum chromodynamics with N/sub color/ < N/sub flavor/.** Yasue, Masaki. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jun 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702916.

In supersymmetric quantum chromodynamics (SQCD) with N/sub color/(=N) < N/sub flavor/(=M), influences of explicit supersymmetry (SUSY)- and chiral symmetry-breakings are examined on the basis of an effective lagrangian for SQCD. The effective lagrangian reproduces symmetry-breakings consistent with complementarity in the massless SQCD and with instanton-analysis in the massive SQCD for M-N massive flavors. A chiral SU(M-N) symmetry, which remains unbroken in the massless SQCD, is broken by the SUSY- breakings even in the absence of the explicit breakings of SU(M-N). Comments are made on SQCD viewed as an underlying dynamics for composite quarks and leptons.

48841 **(RRK—86-6) Some peculiar space-times with spherical symmetry.** Nariai, H. (Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics). Feb 1986. 8p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703347.

As an extension of earlier papers (1950 - 1) on a peculiar solution of the vacuum Einstein equations with the cosmological constant, i.e., R/sub $\mu\nu$/ = Λg/sub $\mu\nu$/, the authors reproduce the content of a research note (dated on October 6th, 1960) on some peculiar space-times with spherical symmetry, because it includes not only the Kantowski and Sach's solution of Einstein's equations for a dust fluid without Λ, but also the one for a dust fluid with Λnot =0, in addition to the case where R/sub $\mu\nu$/ = Λg/sub $\mu\nu$/ (in similar to Nariai's solution).

48842 **Charge neutrality of atoms and magnetic monopoles.** Chu, S. (Department of Physics and Energy Sciences Program, University of California, Riverside, California 92521). *Physical Review Letters;* **59**: No. 13, 1390-1393(28 Sep 1987).

Under the assumption that charge conservation and charge quan- tization are exact, it is pointed out that the expectation values f the charges can still deviate from the exact quantized eigenvalues, as long as the charge superselection rule is not absolute. The deviations can be suppressed by a large energy scale, identified as the mass of the magnetic monopole. Existing experimental results are consistent with ΔQ/sub p/+ΔQ/sub e/≅3 x 10/sup -20/e and ΔQ/sub n/≅-3 x 10/sup -20/e, where ΔQ/sub i/ is the deviation for particle i. Implications, in particular ΔQ/sub ν//sub >//sub e//sub =/≅6 x 10/sup -20/e, are discussed.

48843 **Gaugino masses in superstring inspired models.** Dawson, S. (Lawrence Berkeley Lab., Univ. of California, Berkeley, CA 94720). pp 319-321 of Proceedings of the XXIII international conference on high energy physics. Loken, S.C. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1987). (CONF-860701—). Contract AC03-76SF00098.

From 23. international conference on high-energy physics; Berkeley, CA, USA (16 Jul 1986).

Contributions to the masses of the gauginos in models arising as low energy limits of superstring theories are considered.

6454 Field Theory

REFER ALSO TO CITATION(S) 48701, 48702, 48778, 48779, 48801, 48802, 48843, 49031, 49053

48844 **(DOE/ER/40200—102) Inequivalent quantizations and fundamentally perfect spaces.** Imbo, T.D.; Sudarshan, E.C.G. (Texas Univ., Austin (USA). Center for Particle Theory). Jun 1987. Contract FG05-85ER40200. 11p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014225.

We investigate the problem of inequivalent quantizations of a physical system with multiply connected configuration space X. For scalar quantum theory on X we show that state vectors must be single-valued if and only if the first homology group $H_1(X)$ is trivial, or equivalently the fundamental group $\pi_1(X)$ is perfect. The θ-structure of quantum gauge and gravitational theories is discussed in light of this result.

48845 **(DOE/ER/40272—34) Supersprings.** Curtright, T.L.; van Nieuwenhuizen, P. (State Univ. of New York, Stony Brook (USA). Inst. for Theoretical Physics). 1987. Contract FG05-86ER40272. 21p. (UFTP—87-6; ITP-SB—87-20; YTP—87-13). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014589.

As a covariant model of superstrings with extrinsic curvature terms, this paper proposes and analyses a Lagrangian which is quadratic in the Green-Schwarz equations of motion. Also discussed is the geometry of the superstring world-sheet from an extrinsic point of view.

48846 **(DOE/ER/40272—40) Coset representation of closed loop space in string field theory.** Oh, P. (Florida Univ., Gainesville (USA). Dept. of Physics). 1987. Contract FG05-86ER40272. 8p. (UFTP—87-12). NTIS, PC A02/MF A01; GPO Dep. File Number DE87014592.

By taking analogy with Minkowski space, a construction of a closed loop space CM is made which is an infinite-dimensional coset space. Also included is some of its consequences.

48847 (INIS-SU—418, pp 54-57) **Radiative corrections and supersymmetry in stochastically quantized non-Abelian field theory.** Maliev, I.N. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

In Plasma physics. Collection.

Account of radiative corrections in the limit of the gauge parameter tending to zero, results in violation of supersymmetry group and emergence of a divergent linear member in a two-point non-equilibrium Green function of non-Abelian gauge field. 7 refs.; 1 fig.

48848 **(INS—567) Screening effect in relativistic QED plasma.** Midorikawa, Shoichi; Yamaguchi, Yoshio. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Feb 1986. 14p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702912.

The screening phenomena are studied in the plasma of the relativistic quantum electrodynamics. Shielding lengths of both electric and magnetic fields are given as functions of the temperature and the chemical potential. Applications to heavy ion collisions are briefly discussed.

48849 **(INS—580) Renormalization group approach to QCD phase transitions.** Midorikawa, Shoichi; So, Hiroto; Yoshimoto, Seiji. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Apr 1986. 26p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87702914.

Effective scalar theories for QCD are proposed to investigate the deconfining and chiral phase transitions. The orders of the phase transitions are determined by infrared stabilities of the fixed points. It is found that the transitions in SU(3) gauge theories are of 1st order for any number of massless flavors. The cases of SU(2) and SU(4) gauge theories are also discussed.

48850 **(ITEP—102-1986) Analytical anomaly and heterotic string in the formalism on continual integration.** Morozov, A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702946.

It is shown that P-loop statistical sums for superstring and for heterotic string may be represented as integrals over the space of moduli of Riemann surfaces. There is a similar relation between the sum of analytical functions and statistical sum, arising from continual integral, based on the supersymmetrized action of bosonic string. This relation may provide an argument against compactification on 6-dimensional tori. 9 refs.

48851 **(ITEP—116-1986) Description of a class of superstring compactifications related to semi-simple Lie algebras.** Markushevich, D.I.; Ol'shanetskij, M.A.; Perelomov, A.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 36p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703309.

A class of vacuum configurations in the superstring theory obtained by compactification of physical dimensions from ten to four is constructed. The compactification scheme involves taking quotients of tori of semisimple Lie algebras by finite symmetry group actions. The complete list of such configurations arising from actions by a Coxeter transformation is given. Some topological invariants having physical interpretations are calculated. 14 refs.; 5 figs.

48852 **(JINR-R—2-86-349) Modelling of spin-dependent quark-antiquark bound states in quasipotential approach.** Aleksandrov, L.; Karadzhov, D.; Morozov, P. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 14p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703320.

The direct problem for description of spin-dependent quark-antiquark bound states is formulated in the Logunov-Tavkhelidze-Todorov quasipotential approach. A complete set of equations corresponding to all possible values of the total spin S and total momentum J is given. The regularized quasipotentials nonsingular in the vicinity of zero are constructed from the two model generating potentials: the Richardson potential and the conventional (including Coulomb and linear terms) potential. Asymptotic solutions (as $r \to 0$ and $r \to \infty$) of the total system are obtained. The numerical solution of the spin-system for charmonium and bottomium are found by the core splines method. Numerical results for the conventional model exhibit a quantitatively correct spin-splitting of quarkonium states. The spin-equation in the case S=1, J=0 gives ground-state energies w(cc-bar)=2.752 GeV, w(bb-bar)=8.991 GeV which are quite lower as compared with up-to-date experimental energies of 1^3P_0-states. 13 references, 3 tables.

48853 **(JINR-R—4-86-514) About energy degeneracy of some nucleon excited states in the Skyrme model.** Nikolaev, V.A.; Roka, Eh. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 4p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703325.

The masses of nucleon excited states are calculated in the framework of SU(2) Skyrme model. Rotational and monopole vibrational degrees of freedom are taken into account. It is shown that the states..n+1,j> and ...n,j+1>, where n numbers states with a given spin ...j have practically the same energy. Such a degeneracy is observed experimentally only for the high excited states. 5 references, 1 table.

48854 **(LA-UR—87-2464) Food for thought: Five lectures on lattice gauge theory.** Gupta, R. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 169p. (CONF-8705129—2). NTIS, PC A08/MF A01; 1; GPO Dep. File Number DE87013164.

From Workshop on lattice gauge theory using parallel processors; Beijing, China (21 May 1987).

The topics covered in these lectures are the heavy anti qq potential, glueballs, the chiral transition with dynamical fermions, Weak interaction matrix elements on the lattice and Monte Carlo renormalization group. Even though for the most part these lectures are reviews, many new results and ideas are also presented. The emphasis is on critical analysis of existing data, exposing bottlenecks and a discussion of open problems. Five individual papers have been indexed separately.

48855 (LA-UR—87-2464, pp 1.1-1.28) **The heavy q anti q potential.** 1987. NTIS, PC A08/MF A01. File Number DE87013164. (CONF-8705129—2). Contract W-7405-ENG-36.

From Workshop on lattice gauge theory using parallel processors; Beijing, China (21 May 1987).

The very attempt to construct a potential to describe the interaction of quarks restricts the focus to heavy fermions. It is only when the mass m is large that one can formulate the bound state of a q anti q system as a non-relativistic problem, with binding energies calculable from a potential via the Schroedinger equation. There exist two systems, charmonium and bottomonium that are made up of heavy quarks. The goal of this paper is to derive a potential, check it against these levels, and then with it predict the anticipated toponium spectra.

48856 (LA-UR—87-2464, pp 2.1-2.23) **Glueballs.** 1987. NTIS, PC A08/MF A01. File Number DE87013164. (CONF-8705129—2). Contract W-7405-ENG-36.

From Workshop on lattice gauge theory using parallel processors; Beijing, China (21 May 1987).

The existence of glueballs are a major untested prediction of QCD. We have not been able to reliably calculate the masses (let alone the mixing with q anti q states), or understand in detail the production and decay mechanisms. What we can do is group theory and determine, if QCD is the correct theory, the quantum numbers of the vast number of glueball states. This paper investigates: The experimental status of the existence of glueballs, the lattice calculations of the glueball spectrum, sources for glueballs, better operators to describe phenomenon and the existence of 2^{++} states.

48857 (LA-UR—87-2464, pp 3.1-3.32) **QCD with dynamical fermions: The chiral transition.** 1987. NTIS, PC A08/MF A01. File Number DE87013164. (CONF-8705129—2). Contract W-7405-ENG-36.

From Workshop on lattice gauge theory using parallel processors; Beijing, China (21 May 1987).

Efficient algorithms to include dynamical fermions in numerical simulations are very important in Condensed Matter Physics, Statistical Mechanics and Lattice Gauge theories. In the last four years, considerable effort has been devoted to algorithm development. Discussed in this paper are some aspects of the exact algorithm. By and large, this paper concentrates on the status of the results for the chiral transition.

48858 (LA-UR—87-2464, pp 5.1-5.59) **Monte Carlo renormalization group.** 1987. NTIS, PC A08/MF A01. File Number DE87013164. (CONF-8705129—2). Contract W-7405-ENG-36.

From Workshop on lattice gauge theory using parallel processors; Beijing, China (21 May 1987).

This paper explores the use of the Monte Carlo renormalization group method or field and gauge theories. The topics covered are: Introduction to MCRG and its methodology, Renormalization Group Transformations for d = 4 lattice gauge theories, U(1) Lattice Gauge Theory, β-function and scaling for SU(3) Lattice Gauge Theory, Improved Actions and Methods to calculate them, Improved Monte Carlo Renormalization Group, Renormalization Group inspired Multigrid update, Measuring auto-correlations with block operators, and Effective Field Theories.

48859 (OUP—87-02) **Θ-dependent energy of a particle on a circle.** Fjeldsoe, N.; Ravndal, F. (Oslo Univ. (Norway). Fysisk Inst.). Jan 1987. 7p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752512.

A quantum particle on a circle behaves as a random walker in imaginary time. This can be used to get an exact result for its ground state energy due to the non-trivial topology of the circle.

48860 (SLAC—313) **Restrictions on two Higgs doublet models and CP violation at the unification scale.** Athanasiu, G.G. (Stanford Linear Accelerator Center, Menlo Park, CA (USA)). Apr 1987. Contract AC03-76SF00515. 41p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014696.

Bounds on charged Higgs masses and couplings in models with two Higgs doublets are examined that came from CP violation in the neutral K system. Bounds on charged Higgs masses and couplings in two Higgs doublet models are also obtained from their effects on neutral-B-meson mixing. The bounds are found to be comparable to those obtained with additional assumptions from the neutral K system. The three generation phase invariant measure of CP violation is shown to satisfy a simple and solvable renormalization group equation. Its value is seen to fall by four to eight orders of magnitude between the weak and grand unification scales in the standard model, as well as in its two Higgs and supersymmetric extensions. (LEW)

48861 (SLAC-PUB—4324) **Phenomenological implications of the blown-up orbifolds.** Cvetic, M. (Stanford Linear Accelerator Center, Menlo Park, CA (USA)). May 1987. Contract AC03-76SF00515. 14p. (CONF-8704204—1). NTIS, PC A02. File Number DE87014608.

From 8. workshop on grand unifications; Syracuse, NY, USA (16 Apr 1987).

We discuss the structure of the effective Lagrangian for the (2,2) Z/sub N/ orbifolds and the corresponding Calabi-Yau manifolds which are obtained by "blowing-up" the orbifold singularities. The method to "blow-up" such singularities is reviewed. Results are exact at the string tree-level. In particular, the question of generating an intermediate scale M/sub I/ in such models is addressed. It is shown that for Z/sub N/ orbifolds (except one) and the corresponding blown-up orbifolds which are compactified on any six-torus T^6 which can be obtained by continuously deforming T^4 circle times T^2, all the terms of the type (2727)/sup K/ are absent from the effective superpotential, thus questioning the mechanism for generating a large intermediate scale for such compactifications.

48862 **Properties of the scalar σ meson at finite density.** Bernard, V.; Meissner, U.; Zahed, I. (Centre de Recherches Nucleaires et Universite Louis Pasteur de Strasbourg, Groupe de Physique Nucleaire Theorique, Bote Postale 20, 67037 Strasbourg Cedex, France). *Physical Review Letters;* **59**: No. 9, 966-969(31 Aug 1987).

The behavior of the scalar σ meson at high density is discussed in the context of the Nambu—Jona-Lasinio model. The decrease of the σ-meson mass with increasing density suggests a softening of the equation of state at high density in most of the relativistic mean-field calculations.

48863 **Effective potential and supersymmetry breaking in superstring models.** Binetruy, P.; Dawson, S.; Hinchliffe, I.; Gaillard, M.K. (California Univ., Berkeley, USA. Dept. of Physics; Lawrence Berkeley Lab., CA, USA). *Physics Letters [Section] B;* **192**: No. 3/4, 377-384(2 Jul 1987). Contract AC03-76SF00098;AC02-76CH00016.

We study radiative corrections to an N=1 supergravity model suggested by a particular compactification of superstring theories, including non-perturbative supersymmetry breaking effects. We argue that there is a range of parameters such that the one-loop effective potential has a global minimum for finite values of the scalar fields that determine the gravitino mass. When the potential is minimized with respect to all relevant expectation values, the cosmological constant necessarily vanishes and no soft supersymmetry breaking terms are generated in the gauge non-singlet scalar potential. We also discuss the determination of the gaugino masses at one loop.

48864 **Fixed point structure of quenched, planar quantum electrodynamics.** Love, S.T. (Stanford Linear Accelerator Center, Stanford Univ., Stanford, CA 94305). pp 584-587 of Proceedings of the XXIII international conference on high energy physics. Loken, S.C. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1987). (CONF-860701—). Contract AC03-76SF00515;FG05-86ER40299.

From 23. international conference on high-energy physics; Berkeley, CA, USA (16 Jul 1986).

Gauge theories exhibiting a hierarchy of fermion mass scales may contain a pseudo-Nambu-Goldstone boson of spontaneously broken scale invariance. The relation between scale and chiral symmetry breaking is studied analytically in quenched, planar quantum electrodynamics in four dimensions. The model possesses a novel nonperturbative ultraviolet fixed point governing its strong coupling phase which requires the mixing of four fermion operators.

65 PHYSICS II

REFER ALSO TO CITATION(S) 48173, 48547, 48746, 48980

6510 Nuclear Physics

REFER ALSO TO CITATION(S) 48294, 48915, 48926, 48937, 48941

48865 **(DOE/ER/01067—26) Triangle Universities Nuclear Laboratory: Annual report, TUNL XXVI, 1 September 1986-31 August 1987.** (Duke Univ., Durham, NC (USA); North Carolina Univ., Chapel Hill (USA); North Carolina State Univ., Raleigh (USA)). 1987. Contract AS05-76ER03624;AS05-76ER02408;AC05-76ER01067. 183p. NTIS, PC A09/MF A01; 1; GPO Dep. File Number DE88000262.

At TUNL particular emphasis is placed on reactions induced by polarized protons, deuterons, and neutrons. Research programs include: studies of spin-spin forces with a polarized target and tests of time reversal invariance, high resolution proton scattering on the tandem, examination of the nucleon-nucleus interactions in light nuclei, charged particle induced reactions with polarized projectiles, radiative capture reactions with polarized beams, and weak interaction studies. We also continue a major commitment to the study of the statistical properties of nuclear levels revealed by elastic and inelastic scattering experiments using ultra high energy-resolution proton beams.

48866 **(DOE/ER/40256—2) Cyclotron based nuclear science: Progress report, April 1, 1986-March 31, 1987.** (Texas A and M Univ., College Station (USA)). Aug 1987. Contract FG05-86ER40256. 142p. NTIS, PC A07/MF A01; 1; GPO Dep. File Number DE87014581.

This report contains descriptions of research programs at the Institute, progress on construction of the K500 cyclotron, and descriptions of new experimental devices being built to take advantage of new beams that will be available. Several milestones were reached in construction of the new cyclotron during the period. In early summer, 1986, the magnet was completed with all trim coils and shimming iron in place. During July and August, the final field maps were made, which will be used for calculations of run parameters. In the spring, one rf amplifier was completed and tested over the full frequency and power range. Also in the spring, the computer control system successfully operated positioning controls and trim coil power supplies. Final assembly of the rf system including the dees, resonators and other 2 rf amplifiers is now underway. Initial attempts at getting beam are expected in September. The design of the ECR source was completed in the fall. A beam line configuration has been designed for the K500 cyclotron which will result initially in 3 lines, with a fourth to be added in 1988. With the eminent completion of the K500, there has been considerable instrumentation development. A 4π neutron calorimeter is under construction for heavy ion reaction studies, construction is beginning on a proton spectrometer for studies of Gamow-Teller matrix elements with the (d,^{2}He) reaction, and several detector systems are being developed. During the year, the 88 inch cyclotron operated 4845 hours for research and beam development. Research programs in nuclear science scheduled 57% of the time. Atomic physics programs used 19% of the time, and a program in trace analysis scheduled 6%. An industrial testing laboratory used 18 hours. The remainder of the time was used for beam development, primarily for increasing the energy and/or intensity of heavy ion beams.

48867 **(DOE/ER/40261—2) Electron interactions with nuclei: Progress report.** McCarthy, J.S. (Virginia Univ., Charlottesville (USA). Dept. of Physics). Aug 1987. Contract FG05-86ER40261. 82p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87014587.

High energy is being conducted at the Stanford Linear Accelerator Center. This includes inclusive electron scattering, electroexcitation of the delta in nuclei, longitudinal and transverse response in the quasi-elastic region, the q^2 dependence of ^{4}He(e,e'p), deep inelastic scattering from nuclei, transverse and longitudinal response in the resonance region, nuclear physics at PEP and 1.6 GeV spectrometer properties. Additional high energy research on electron scattering on ^{3}H and ^{3}He and the nuclear structure of ^{205}Tl and ^{206}Pb are being conducted at MIT-Bates. Other activities are being carried out at Saclay and research and development for Monte Carlo studies of Hall A spectrometers for CEBAF is being conducted.

48868 **(EFI—822(49)-85) Investigation of electrons with / sup 6/Li, /sup 9/Be, /sup 12/C, /sup 28/Si nuclei in the region of quasi-elastic peak and δ/sub 33/-resonace.** Bagdasaryan, D.S.; Boyakhchyan, E.M.; Kazaryan, G.B.; Karilyan, M.D.; Markaryan, Eh.R.; Mkrtchyan, G.G.; Troshenkova, I.A. (Erevanskij Fizicheskij Inst. (USSR)). 1985. 18p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702884.

The cross sections (e,e') for the reactions on /sup 6/Li, /sup 9/Be, /sup 2/C and /sup 28/Si nuclei are measured in the region of quasi-elastic peak and Δ/sub 33/-resonance at 1.5 and 2.0 GeV energies. Electrons scattered at angles 15.5 deg were analysed with a magnetic spectrometer. The apparatus calibration was carried out according to the process of elastic electron scattering on polyethylene hydrogen. The background was taken into account under measurements without target and at the spectrometer reversed polarity. The experimental results are in good agreement with calculations by means of shell model involving the dispersion relations for determination of nucleon cross sections in the Δ/sub 33/-resonance region. Excess of the experiment over the theory is observed at the pion production threshold.

48869 (INIS-SU—416, pp 5-12) **Momentum spectra of pions and protons in p, /sup 12/C and /sup 22/Ne collisions with emulsion nuclei at 4.5 GeV/c.** Leskin, V.A.; Tolstov, K.D. (AN Tadzhikskoj SSR, Dushanbe. Fiziko-Tekhnicheskij Inst.; Joint Inst. for Nuclear Research, Dubna, USSR. Lab. of High Energy). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179. (N—17-86).

In JINR rapid communications. Collection.

In inelastic p, /sup 12/C and /sup 22/Ne collisions with emulsion nuclei at 4.5 GeV/c per nucleon the shower particles are separated into π/sup +-/-mesons and protons that have undergone inelastic interaction. In the case of /sup 12/C and /sup 22/Ne nuclei, the p, d and t projectile fragments conserving their energy are also separated. The ratios for the yields of these particles and the momentum, emission angle and rapidity distributions of π/sup +-/ and protons have been obtained. The average momenta of π-mesons for all projectiles are close to their values in nucleon-nucleon collisions. A weak dependence of the momenta and rapidities of mesons and interacting protons on the number of nucleons on their way in the target nucleus is shown. 7 refs.; 5 figs.; 4 tabs.

48870 (INIS-SU—416, pp 13-18) **Measurement of /sup 19/F nucleus interaction at 4 GeV/c per nucleon.** Golovin, V.M.; Golutvin, I.A.; Dolya, S.N. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179. (N—17-86).

In JINR rapid communications. Collection.

The cross sections of /sup 19/F nucleus interaction with the nuclei of different elements at 4 GeV/c x nucleon momentum in reactions are measured. In the finite state of these reactions the fragment with charge $Z \leqq 8$ is formed. The experiment apparatus comprises a transmission detector where the nuclei trajectory at the target input has been measured with proportional chambers whereas the nuclear charge before and after the target has been measured by Cherenkov counters. Experimental data obtained with accuracy - 2% are presented for carbon, aluminium, copper, indium, tungsten, bismuth and uranium targets. The dependence of cross sections on atomic number of the target coincides except of cross section of interaction with heavy targets. 14 refs.; 4 figs.; 1 tab.

48871 **(INS—606) Three-body coupled-channel theory of scattering and breakup of light and heavy ions.** Kamimura, M.; Kameyama, H.; Kawai, M.; Sakuragi, Y.; Iseri, Y.; Yahiro, M.; Tanifuji, M. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Sep 1986. 12p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702929.

It is shown that the method of coupled discretized continuum channels (CDCC) based on the three-body model for direct reactions is very successful in explaining the following, recently developed experiments using deuteron, /sup 6/Li and /sup 7/Li projectiles whose breakup threshold energies are very low: (i) Precise measurement of all the possible analyzing powers in elastic scattering of polarized deuteron at 56 MeV, (ii) scattering of polarized deuteron at intermediate energies, (iii) deuteron projectile breakup at 56 MeV, (iv) scattering of polarized /sup 7/Li at 20 and 44 MeV and (v) projectile breakup of /sup 6/Li at 178 MeV and /sup 7/Li at 70 MeV. The CDCC analyses of those data are made transparently with no adjustable parameters.

48872 **(ITEF—165-1986) Production of deuterons and tritium nuclei with the 0.6-1.83 GeV/c momenta on Be, Al, Cu, Ta nuclei at the 119 deg angle by 10 GeV protons.** Boyarinov, S.V.; Gerzon, S.A.; Kiselev, Yu.T.; Leksin, G.A.; Martem'yanov, A.N.; Novikov, V.L.; Semenov, S.V.; Terekhov, Yu.V.; Shejnkman, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 20p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703299.

Invariant production cross sections of cumulative deuterons and tritium nuclei on Be, Al, Cu, Ta nuclei in the previously unstudied momentum range from 0.6 to 1.83 GeV/c are measured. It is shown that the invariant production cross sections of deuterons and tritium nuclei on heavy nuclei are well described by the fusion model. The contribution of another mechanism, possibly pick-up, is noticeable for deuteron production cross section with < 0.6 GeV/ cxnucleon momentum on Be nuclei. 15 refs.; 11 figs.

48873 (JINR—D-4-85-851, pp 51-82) **Experimental investigation of single-particle modes at high excitation energy.** Gales, S. (Paris-11 Univ., 91 - Orsay, France. Inst. de Physique Nucleaire). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Review of present knowledge of the so-called giant single-particle (or single-hole) resonances is given. These giant resonances are the response of a nucleus to an external field acting on its single-particle degrees of freedom. With the help of transfer reactions investigated at high incident energies, empirical knowledge of the single-particle response function has been greatly enhanced. Inner-neutron hole strengths have been observed in a variety of one nucleon pick-up reactions for a wide range of medium and heavy nuclei. New spectroscopic tools like the use of polarized beams or the investigation of (p, pn) reactions, have or will proved their validity. More decisive progress is expected in the near future by the development of the decay studies. Strength functions of high-lying states could be directly deduced from exclusive experiments without any assumption on the underlying background or on the reaction mechanism. From the theoretical side, the correct description of the form factor of deeply-bound or high-lying particle states are highly desirable whereas in the framework of the reaction theory, the explanation of the underlying background is still to come. Both the quasiparticle-phonon nuclear model and the selt-consistent approaches have reached a good qualitative agreement with the empirical systematics. Moreover the link between single-particle and collective degrees of freedom in the nucleus has been established in order to explain the damping of high-lying single-particle strengths. 59 refs.; 39 figs.

6511 Experimental Techniques

48874 **Table of radioactive isotopes.** Browne, E.; Firestone, R.B.; Shirley, V.S. New York, NY; John Wiley and Sons Inc. (1986). 1050p. John Wiley and Sons Inc., 605 Third Avenue, New York, NY 10150.

This book provides a comprehensive and critical evaluation of the nuclear and atomic properties of radioactive isotopes. Detailed radiation data for about 2000 of the 2755 known nuclides are presented in this up-to-date and concise book. The main section is organized by mass number (A), with entries for a given A derived from and referenced to the most recent corresponding evaluation in Nuclear Data Sheets or Nuclear Physics.

6512 Nuclear Properties And Reactions, A=1-5, Experimental

48875 **(PB—87-201794/XAB) Model for the nuclear effects of the d-t-muon fusing state.** Danos, M.; Biedenharn, L.C.; Stahlhofen, A.A. (National Bureau of Standards, Washington, DC (USA)). Apr 1987. 26p. (NBSIR—87/3532). NTIS, PC A03/MF A01.

A simple model is constructed which is used to illustrate the interplay between the strong nuclear forces and the Coulomb molecular forces in the description of the resonant d-t-muon fusion process.

48876 **Measurement of the A dependence of the EMC effect and R in deep-inelastic electron scattering from nuclei.** Rock, S.E. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 166-172(15 Sep 1985). (CONF-8503120—). Contract AC03-76SF00515.

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

Measurement of the A dependence of deep inelastic electron scattering have been made for a wide range of x and Q^2 values. The ratio R = σ/sub L//σ/sub T/ is found to depend on A. Implications for the structure functions are discussed.

48877 **Electromagnetic meson production.** Bernstein, A.M. (Physics Department and Laboratory for Nuclear Science, Massachusetts Institute of Technology, Cambridge, MA 02139). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 271-295(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

Electro- and photo-production of pions and Kaons are compared. The similarities and differences in the production mechanisms are discussed, including the special role of the delta in pion production. The topics that are discussed include; 1) inclusive experiments in the delta region with photons and electrons. The results have been surprising in that the cross section per nucleon is constant for all nuclei that have been studied starting with ^{4}He; 2) A test of the reaction mechanism for photo-pion production. New high quality data obtained primarily at Bates which will strongly test theoretical models are presented; 3) The prospects for electromagnetic production of K^+ mesons forming bound hyper-nuclear states is presented. These studies which will depend on a high intensity, high duty cycle, electron accelerator of over 3 GeV should produce data which is complimentary to a Kaon factory.

6513 Nuclear Properties And Reactions, A=6-19, Experimental

48878 **(CONF-8706113—6) Nucleus-nucleus collisions at relativistic energies: The CERN WA80 experiment.** Plasil, F.; Albrecht, R.; Awes, T.C.; Baktash, C.; Beckmann, P.; Berger, F.; Bock, R.; Claesson, G.; Dragon, L.; Ferguson, R.L. (Oak Ridge National Lab., TN (USA); Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.); Muenster Univ. (Germany, F.R.); Lawrence Berkeley Lab., CA (USA); Lund Univ. (Sweden); Tennessee Univ., Knoxville (USA)). 1987. Contract AC05-84OR21400. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014948.

From 6. Adriatic international conference on nuclear physics; Dubrovnik, Yugoslavia (15 Jun 1987).

QCD lattice calculations predict that, at sufficiently high energy densities, hadronic matter undergoes a transition to a new phase of matter, the quark-gluon plasma, in which quarks and gluons are deconfined over a relatively large volume. It has been suggested that collisions between heavy nuclei at ultrarelativistic

energies may produce the energy densities, estimated to be greater than 2 to 3 GeV/fm^3, necessary for this phase transition to occur. An important goal of the first experiments with ultrarelativistic heavy-ion beams at the SPS accelerator at CERN is to investigate the extent to which this suggestion is correct. The primary experimental quantity used for estimating the energy density is the transverse energy, E/sub T/. We present here energies measured at zero degrees, together with transverse energy measurements. Estimates of attained energy densities and preliminary transverse momentum distributions of neutral products are also presented. 24 refs., 7 figs.

48879 (INIS-SU—416, pp 36-40) **On the study of the / sup 7/Be(n,p)/sup 7/Li reaction in the neutron energy range from 0.025 to 500 eV.** Gledenov, Yu.M.; Zvarova, T.S.; Mitrikov, M.P.; Mitrikova, R.S.; Popov, Yu.P.; Salatskij, V.I.; Fung Van Duan. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179. (N—17-86).

In JINR rapid communications. Collection.

The first measurement of the energy dependence of the /sup 7/Be(n, p)/sup 7/Li reaction cross section has been carried out using a non-standard procedure of identification of low energy charged particles with the ionization chamber with two grids. As a result there were obtained the thermal cross section and the energy dependence of investigated reaction cross section in the neutron energy range up to 0.5 keV. It was shown that at neutron energies below 140 eV the cross section followed the 1/v law, where v was the neutron velocity. Two independent series of measurements have revealed a deviation from the 1/v law in the region E/sub n/ — 140-200 eV which might have probably been ascribed to the presence of a narrow resonance on neutrons with orbital momenta different from zero. The question about the resonance responsible for the large (5 x 10/sup 4/ b) thermal cross section remains still open. 12 refs.; 2 figs.

48880 (INS—596) **Scattering of polarized /sup 7/Li by / sup 120/Sn and projectile-target spin-dependent interactions.** Sakuragi, Y.; Yahiro, M.; Kamimura, M.; Tanifuji, M. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jul 1986. 57p. NTIS (US Sales Only), PC A04/MF A01. File Number DE87702921.

Scattering of /sup 7/Li by /sup 120/Sn targets at E/sub lab/ = 44 MeV is investigated in the coupled-channel frame by taking account of the projectile virtual excitations to the lowest three excited states. Calculations are performed by the cluster-folding (CF) interactions and the double-folding (DF) one. Both interactions reproduce very well the expeimental data on the cross section, the vector analyzing power, the second-rank tensor ones and the third-rank tensor one in elastic and projectile inelastic scattering, although some differences are found between the CF results and the DF ones. In the calculation, the virtual excitations of the projectile are important for most of the analyzing powers and the spin-orbit interaction is indispensable for the vector analyzing power. These features are in contrast to those in /sup 7/Li - /sup 58/Ni scattering at 20 MeV and are interpreted as over-Coulomb-barrier effects. The scattering amplitudes and the analyzing powers are investigated by the invariant amplitude method, which provides a key connecting the spin-dependent interactions to the analyzing powers. The method proposes an important relationship between the tensor analyzing powers, which is useful in analyses of both theoretical and experimental results. Finally, it is found that in the elastic scattering the second-rank tensor analyzing powers are proportional to the strength of the second-rank tensor interaction and the vector and third-rank tensor analyzing powers to the square or cube of the strength of this interaction, while in the inelastic scattering the cross section is proportional to the square of the strength of the tensor interaction, other quantities being weakly dependent on the strength.

48881 (KFTI—86-24) **Carbon photodisintegration with nucleon pair production in intermediate energy range.** Voloshchuk, V.I.; Dogyust, I.V.; Kirichenko, V.V.; Khodyachikh, A.F. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 9p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703333.

Using diffusion chamber, installed on a beam of bremsstrahlung gamma-quanta with the maximum energy of 150 MeV, reactions of carbon photodisintegration with the nucleon pairs production have been studied. It is shown that at the energies exceeding 50 MeV electric dipole interaction of gamma-quanta with correlated neutron-proton pairs of a nucleus takes place. Cross sections of reactions with the yield of two protons both with neutrons knocked out and without neutron participation constitute (7.71 +- 0.15)% of cross sections of the reactions with np-pairs in the final state. Cross sections of gamma-quanta absorption by correlated pp-pairs do not exceed (0.29 +- 0.20)% of cross sections with np-pair yield. Conventional quasideuteron model described satisfactorily the dependence of integral photoabsorption cross section on the energy. 11 references, 4 figures, 1 table.

48882 **Isovector couplings for nucleon charge-exchange reactions at intermediate energies.** Love, W.G.; Nakayama, K.; Franey, M.A. (Department of Physics and Astronomy, University of Georgia, Athens, Georgia 30602). *Physical Review Letters;* **59**: No. 13, 1401-1404(28 Sep 1987).

The isovector parts of the effective nucleon-nucleon interaction are studied by examination of the reaction /sup 14/C(p,n) at intermediate energies near zero momentum transfer with use of recently developed G-matrix and free—t-matrix interactions. The spin-independent coupling (V/sub tau/) exhibits a strong energy and density dependence which, in the case of the G matrix based on the Bonn potential, significantly improves the agreement between calculated values of chemical bondV/sub σ//sub tau//V/ sub tau/chemical bond^2 at q = 0 and those recently extracted from the reaction /sup 14/C(p,n).

48883 **(γ,p) and (π,p) reactions in the Δ (1232) resonance region.** Matthews, J.L. (Massachusetts Institute of Technology, Cambridge, MA 02139). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 296-311(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

A sample of the available experimental data on (γ,p) and (π,p) reactions in complex nuclei is presented, together with a few recent results on the (γ,np) and (π^+,pp) processes. The data are seen to provide information on photon and pion interaction mechanisms in the Δ (1232) resonance region.

48884 **Charge and transverse momentum distributions from the fragmentation of 1.2 GeV per nucleon /sup 139/La nuclei.** Brady, F.P.; Christie, W.B.; Romero, J.L.; Tull, C.E.; Webb, M.L.; Crawford, H.W.; Greiner, D.E.; Lindstrom, P.J.; Sann, H. (University of California, Davis, CA 95616). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 382-383(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

The charge and transverse momentum distributions for the heavy-ion reactions with 1.2 GeV per nucleon 139-La incident on 12-C, 16-O, and 40-Ar targets are presented. Fragment momentum isotropy predicted in some models does not appear in these results.

6514 Nuclear Properties And Reactions, A=20-38, Experimental

48885 (INS—593) **Unitary three-body calculation of nucleon-nucleon scattering. Improved model for πN P/sub 33/ interaction.** Tanabe, H.; Ohta, K. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jul 1986. 62p. NTIS (US Sales Only), PC A04/MF A01. File Number DE87702918.

We calculate nucleon-nucleon elastic scattering phase parameters based on a unitary, relativistic, pion-exchange model. The results are highly dependent on the off-shell amplitudes of πN scattering. The isobar-dominated model for the P/sub 33/ interaction leads to too small pion production rates owing to its strong suppression of off-shell pions. We propose to expand the idea of the Δ-isobar model in such a manner as to incorporate a background (non-pole) interaction. The two-potential model, which was first applied to the P/sub 11/ partial wave by Mizutani and Koltun, is applied also to the P/sub 33/ wave. Our phenomenological model

for πN interaction in the P/sub 33/ partial wave differs from the conventional model only in its off-shell extrapolation, and has two different variants for the πN -> Δ vertex. The three-body approach of Kloet and Silbar is extended such that the background interactions can be included straightfowardly. We make detailed comparisons of the new model with the conventional one and find that our model adequately reproduces the /sup 1/D/sub 2/ phase parameters as well as those of peripheral partial waves. We also find that the longitudinal total cross section difference Δσ/sub L/ (pp -> NNπ) comes closer to the data compared to Kloet and Silbar. We discuss about the backward pion propagation in the three-body calculation, and the Pauli-principle violating states for the background P/sub 11/ interaction.

6517 Nuclear Properties And Reactions, A=90-149, Experimental

48886 (CONF-870970—3) Radioactivities with 146 ≦A ≦152 investigated at the OASIS facility: Evidence for ^{147}Tm β-decay. Toth, K.S.; Nitschke, J.M.; Wilmarth, P.A.; Ellis-Akovali, Y.A.; Sousa, D.C.; Vierinen, K.; Moltz, D.M.; Gilat, J.; Rao, N.M. (Oak Ridge National Lab., TN (USA); Lawrence Berkeley Lab., CA (USA)). 1987. Contract AC05-84OR21400. 4p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014797.

From 5. international conference on nuclei far from stability; Lake Rosseau, Canada (14 Sep 1987).

Progress is reported for a collaborative program, involving researchers from the Lawrence Berkeley and Oak Ridge National Laboratories, which has now been in progress at the SuperHILAC OASIS on-line facility for more than two years. In these investigations properties of short lived nuclei near the N = 82 neutron shell have been studied, their decays being assayed with particle, gamma ray, x ray, and positron detectors. Nuclides investigated so far were produced in ^{58}Ni bombardments of ^{96}Ru, ^{94}Mo, and ^{92}Mo. The focus of the study has been primarily two-fold: (1) to gain insight into the nature of the sharp peaks seen in the delayed proton spectra that accompany the beta decays of N = 81 even Z precursors, and (2) to investigate low lying states in nuclei near N = 82, levels whose structures should be describable by shell model analyses. 9 refs., 2 figs. (DWL)

48887 (CONF-8703121—6) Double beta decay experiment using ^{100}Mo. Alston-Garnjost, M.; Dougherty, B.L.; Kenney, R.W.; Krivicich, J.M.; Tripp, R.D.; Nicholson, H.W.; Dieterle, B.D.; Leavitt, C.P. (Lawrence Berkeley Lab., CA (USA); Mount Holyoke Coll., South Hadley, MA (USA); New Mexico Univ., Albuquerque (USA)). 1987. Contract AC02-78ER04831;AC03-76SF00098. 9p. NTIS, PC A02. File Number DE87014069.

From Telemark IV - neutrino mass and neutrino astrophysics; Ashland, WI, USA (16 Mar 1987).

We have started a search for double beta decay of ^{100}Mo using lithium drifted silicon Si(Li) detectors and thin molybdenum (Mo) foils. The experiment is located in the Consolidated Silver mine at Osburn, Idaho. We present preliminary results comparing a prototype array above ground to the array below ground, both without Mo foils. We also present data from an underground run with ^{100}Mo foils which gives a half-life limit for the Majoron decay mode of ^{100}Mo greater than 5 x 10^{19} years (68% confidence level) equivalent to 8 x 10^{20} years for ^{76}Ge. 4 refs., 8 figs.

6518 Nuclear Properties And Reactions, A=150-189, Experimental

48888 (BNL—40148) Neutron capture studies on ^{189}Os. Bruce, A.M.; Colvin, G.G.; Gelletly, W.; Warner, D.D. (Brookhaven National Lab., Upton, NY (USA); Manchester Univ. (UK). Schuster Lab.; Institut Laue-Langevin, 38 - Grenoble (France); Daresbury Lab. (UK)). 1987. Contract AC02-76CH00016. 4p. (CONF-8708101—9). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014918.

From 6. international symposium on capture gamma-ray spectroscopy; Leuven, Belgium (31 Aug 1987).

An extensive study of the level structure of ^{189}Os has been carried out using the (n,γ) and (n,e-) reactions. The use of the Average Resonance Capture technique ensures that the complete set of 1/2-, 3/2- states has been established up to 1500 keV in excitation energy and secondary γ-rays have been measured in singles and coincidence to build up the detailed level scheme. 7 refs., 2 figs.

48889 (CONF-870970—2) Nuclear structure effects on alpha reduced widths. Toth, K.S.; Ellis-Akovali, Y.A.; Kim, H.J.; McConnell, J.W. (Oak Ridge National Lab., TN (USA); UNISOR, Oak Ridge, TN (USA); Lawrence Berkeley Lab., CA (USA)). 1987. Contract AC05-84OR21400. 11p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014796.

From 5. international conference on nuclei far from stability; Lake Rosseau, Canada (14 Sep 1987).

A review of α widths for s-wave transitions is presented together with a discussion of the following topics: (1) a new determination of the ^{219}Ra half-life and its relation to reflection asymmetry in nuclei near N = 130, (2) a measurement of the ^{194}Pb α-decay rate and the influence of the Z = 82 gap on neutron-deficient Pb nuclei, and (3) an up-date of α-decay-rate systematics for isotopes in the rare earth and medium-weight mass regions. 16 refs., 6 figs.

48890 (CONF-8706193—1) Energetic M1 transitions as a probe of nuclear collectivity at high temperatures. Baktash, C. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014564.

From International conference on nuclear shapes; Crete, Greece (28 Jun 1987).

At ORNL, we have recently utilized the Spin Spectrometer setup to investigate the differential effects of increasing spin and excitation energy on nuclear shape and collectivity in ^{158}Yb. Along the yrast line of this and other N = 88 nuclei, weakly prolate shapes gradually give way to triaxial, and then finally to non-collective oblate shapes as the spin approaches 40 h-bar. However, above the yrast line, large deformation and collectivity once again sets in. This is evidenced by the emergence of a broad quadrupole structure (E/sub γ/ ≃ 1.2 MeV) in the continuum gamma-ray spectra that grows with increasing temperature. The short (sub ps) lifetimes of these transitions attest to the collective nature of these structures. The emergence and growth of the quadrupole structure at high excitation energies is closely correlated with the appearance of energetic (E/sub γ/ ≃ 2.5 MeV), fast M1 transitions which form another broad structure in the continuum spectra. From the centroid of the M1 bump, a quadrupole deformation parameter of 0.35 is inferred. Because of this sensitivity, these energetic M1 transitions provide a unique probe of nuclear shape in the excitation energy range of ≃ 3 to 10 MeV. 6 refs., 2 figs.

48891 (CONF-8708123—1) Nuclear collectivity at high spins determined from lifetime measurements. Johnson, N. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 13p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014408.

From International conference on nuclear structure through static and dynamic moments; Melbourne, Australia (25 Aug 1987).

Doppler-shift recoil-distance lifetime measurements have been performed on several nuclei whose Fermi surfaces ranged from the bottom to the middle of the i/sub 13/2/ neutron shell. The collective behavior deduced from the data is interpreted in terms of evolving triaxiality at high rotational frequencies as a result of the shape-driving influence of i/sub 13/2/ quasineutrons, in general agreement with both cranked shell model and self-consistent theories. Evidence is also presented for influence from h/sub 9/2/ protons at very low rotational frequencies in light tungsten nuclei. 21 refs., 8 figs.

48892 (INIS-mf—10663) Study of the new M1 orbital mode in /sup 154/Gd and the structure of the Majorana interaction in the interacting boson model (IBM). Hartmann, U. (Technische Hochschule Darmstadt (Germany, F.R.). Inst. fuer Kernphysik). Aug 1986. 116p. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87752619.

For the detection of the new M1 orbital mode in /sup 154/Gd the excitation energy range between E/sub x/=1.7 and 4.0

MeV was studied with high-resolution electron scattering. Altogether eight spectra with incident energies between E/sub 0/=20 and 50 MeV and scattering angles between Θ=117/sup 0/ and 165/sup 0/ were taken up. The new orbital mode could be detected at an excitation energy of E/sub x/=2.936 MeV with a transition strength of B(M1,k)arrow up = 0.85 +- 0.10 μ/sub N//sup 2/. In the excitation energy range studied nine magnetic dipole excitation with a transition strength of altogether 4.3 μ/sub N//sup 2/ were found. The search for further members of the k/sup π/=1/sup +/ band the bandhead of which is the new orbital mode yielded clear hints to a mixed-symmetric J/sup π/=2/sup +/ state, but no to a magnetic octupole excitation. For the nuclei /sup 154/Sm, /sup 154/Gd, /sup 156/Gd, /sup 158/Gd, /sup 164/Dy, and /sup 168/Er the parameters of the IBM Hamiltonian were determined which contains the pairing, quadrupole, and Majorana force. For the Majorana-force strength parameter a systematic was established which encloses also the nuclei /sup 46/Ti, /sup 110/Pd, /sup 232/Th, and /sup 238/U. By this systematic the excitation energy of the new orbital mode can be predicted. By means of the performed calculations the symmetry properties of nuclei could be illustrated in the framework of the IBM for the first time by means of an equilateral triangle. The edges of the triangle correspond thereby to the limiting cases of a vibrator, rotator, respectively γ-unstable nucleus.

48893 (JINR-R—4-86-756) Mechanism of neutron inelastic scattering on the ^{164,166,168,170}Er isotopes. Grigor'ev, E.P.; Ivanova, S.P.; Kabesas, R.; Miko, G. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703326.

Submitted to the journal Izv. AN SSSR, Ser. Fiz.

Cross sections of neutron inelastic scattering on $^{164, 166, 168, 170}$Er isotopes are calculated with taking into account both direct and compound nucleus processes. The calculations are given on the base of the axial and nonaxial rotator models. It is shown that the theoretical cross sections are in accordance with the experimental data, but for correct understanding of anharmonicity it is necessary to have more precise measurements. 18 references, 4 tables.

48894 (OUP—87-08) Particle-vibration coupled states in /sup 161/Dy. Ramsoey, T.; Atac, A.; Engeland, T.; Guttormsen, M.; Rekstad, J.; Loevhoeiden, G.; Thorsteinsen, T.F.; Vaagen, J.S. (Oslo Univ. (Norway). Fysisk Inst.). Mar 1987. 19p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752513.

States in /sup 161/Dy have been populated using the inelastic (tau,tau') reaction. Strong particle groups in the 0.9 MeV excitation region are interpreted to arise from a coupling of an odd particle in the [642]5/2/sup +/ Nilsson orbital to a γ-vibration of the even core. The 1/2/sup +/ and 3/2/sup +/ members of the antialigned particle-vibration sequence are found to interact with states from the N=4 and N=6 oscillator shell, thus modifying previous conclusions on the ΔN=2 coupling. The particle-vibration states are discussed within a particle-core model. 16 refs.

48895 (OUP—87-10) Decay of hot dysprosium nuclei. Atac, A.; Rekstad, J.; Guttormsen M.; Messelt, S.; Ramsoey, T.; Thorsteinsen, T.F.; Loevhoeiden, G.; Roedland, T. (Oslo Univ. (Norway). Fysisk Inst.). Mar 1987. 22p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752514.

The γ-decay following the /sup 162,163/Dy(/sup 3/He,αxn) reactions with E/sub (sup 3)He/=45 MeV has been studied. Non-statistical γ-radiation with energies of E/sub γ/≃1 MeV and ≃2 MeV is found for various residual nuclei. The properties of these γ-ray bumps depend on the number of emitted neutrons and reveal an odd-even mass dependence. New techniques to extract average neutron energies as a function of excitation energy and of the number of emitted neutrons are employed. The deduced neutron energies are consistent with Fermi-gas model predictions. 11 refs.

6519 Nuclear Properties And Reactions, A=190-219, Experimental

48896 (BNL—40066) Relativisitic heavy ion collisions. Tannenbaum, M.J. (Brookhaven National Lab., Upton, NY (USA)). 1987. Contract AC02-76CH00016. 22p. (CONF-8706200—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014292.

From CEBAF summer workshop; Newport News, VA, USA (22 Jun 1987).

Some of the objectives and observables of Relativistic Heavy Ion Physics are presented. The first experimental results from oxygen interactions at CERN, 200 GeV/c per nucleon, and BNL, 14.5 GeV/c per nucleon are shown. The data indicate more energy emission than was originally predicted. 2. refs., 19 figs.

6520 Nuclear Properties And Reactions, A=220 And Above, Experimental

48897 (DOE/ER/40246—2) Neutron scattering studies in the actinide region: Progress report for period August 1, 1986-July 30, 1987. Beghian, L.E.; Kegel, G.H.R. (Lowell Univ., MA (USA). Radiation Lab.). Aug 1987. Contract FG02-86ER40246. 5p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014602.

During the report period we have been active in the following research areas: (1) measurements of angular distributions and of excitation functions of neutrons scattered inelastically from highly excited states in Th-232 and U-238 for incident energies above 2 MeV; (2) analysis of neutron elastic and inelastic scattering measurements on low-lying levels of actinide nuclei; (3) detector development work for iron filter studies at 82 keV and for fission neutron energy spectroscopy; and (4) improvements in accelerator operation.

48898 (INIS-SU—419, pp 37-39) Isotopic dependence for nuclear reactions induced by negative muons. Belovitskij, G.E. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780005.

Kratkie Soobshcheniya po Fizike.; (no.8).

In Experimental and theoretical physics. Collection.

The relation binding the probability of the reaction (μ/sup -/, pxn) with (N-Z)/A parameter, where A,N,Z-number of nucleons, neutrons and protons in a nucleus is established. The relation is applicable to reactions (μ/sup -/, pxn) with stable as well as radioactive nuclei (nuclear fission fragments). 8 refs.; 2 figs.

48899 (JINR-E—7-86-732) Experimental study of α-fission fragment correlations in the ^{232}Th(^{12}C,αf) reaction. Augustynyak, W.; Borcea, C.; Lewitowicz, M.; Nguen Hoai Chau; Penionzhkevich, Yu.E.; Sandukovski, V.G.; Chojnacki, S.; Sowinski, M. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions). 1986. 11p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703318.

Submitted to the journal J. Phys. G: Nucl. Phys.

Inclusive and correlation spectra of alpha particles and fission fragments were measured for the ^{232}Th+^{12}C (85 MeV) reaction, with the aim of separating different mechanism contribution. At backward angles α emission can be explained for by the evaporation processes. At forward angles the most important contribution is given by the break-up-fusion process. Mass distributions for compound nuclei ^{244}Cm (E*=58 MeV, ff coincidences), and ^{240}Pu(E*=37 MeV, ff/sub α/ coincidences) were obtained. In the case of ^{240}Pu mass distribution has a shape different from those obtained in light ion reactions at the same excitation energy idicating the strong influence of the entrance channel. The dependence of the mass distribution shape on the α-particle energy is also examined. The weak dependence of this shape on the α particle energy seems to be a combined effect of the projectile α cluster structure and of the Q values of different contributing exit channels. 16 references, 8 figures.

6530 Nuclear Theory

REFER ALSO TO CITATION(S) 48795, 48812, 48824, 48837, 48837, 48848, 48866, 48875

48900 (ANL—87-13) Physics Division annual review, 1 April 1986-31 March 1987. (Argonne National Lab., IL (USA)). Aug 1987. Contract W-31109-ENG-38. 345p. NTIS, PC A15/MF A01; 1; GPO Dep. File Number DE88000012.

This review presents a broad view of the research activities within the Division for the year ending in March 1987. Major topic areas are: Medium Energy Physics Research; Theoretical Nuclear Physics; Superconducting Linac Development, and Accelerator Operations. Research at ATLAS is also included as a broad topic. Included in this research are studies in the areas of: Quasielastic Processes and Strongly Damped Collisions; Fusion and Fission of Heavy Ions; High Angular Momentum States in Nuclei; Accelerator Mass Spectroscopy; and Equipment Development.

48901 (CEA-CONF—8772) Excited nuclei fragmentation. Ngo, C.; Desbois, J.; Nemeth, J.; Barranco, M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Inst. dè Recherche Fondamentale (IRF)). Nov 1986. 20p. (In French). (CEA-DPH-N-S—2392; CONF-8611138—2). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752577.

From Saturne workshop; La Londe-les-Maures, France (10 Nov 1986).

Experimental indications leading to the thought of a very excited nucleus fragmentation are resumed. Theoretical approaches are briefly described; they are used to explain the phenomenon in showing off they are based on a minimum information principle. This model is based on time dependent Thomas-Fermi calculation which allows the mean field effect description, and with a site-bound percolation model which allows the fluctuation description.

48902 (CONF-8705188—1) Octupole instability in the heavy barium region. Nazarewicz, W.; Leander, G.A.; Tabor, S. (Florida State Univ., Tallahassee (USA); Politechnika Warszawska (Poland). Inst. Fizyki; Oak Ridge Associated Universities, Inc., TN (USA)). 1987. Contract AC05-84OR21400. 5p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87012925.

From 25. winter school on nuclear structure; Zakopane, Poland (1 May 1987).

Quasi-molecular rotational bands characterized by spin states of alternating parity connected by enhanced E1 transitions have recently been observed in several transitional nuclei around ^{224}Th. The appearance of such bands can easily be understood by assuming the absence of intrinsic parity symmetry in these nuclei. Another likely region on the chart of nuclides to find octupole-unstable nuclei is the region of nuclei around ^{146}Ba. In fact, in several Xe, Ba and Ce isotopes with n approximately equal to 88, calculations yield octupole-unstable ground states. The main goal of the present study was to calculate equilibrium deformations of doubly-even Xe, Ba, Ce, Nd, Sm and Gd nuclei with neutron numbers between 84 and 94. The method used was the Woods-Saxon-Bogolyubov cranking model method combined with the shell correction approach. The results of these calculations confirm previous expectations of octupole deformed mean fields at low and medium spins in Xe-Sm nuclei with neutron numbers around N = 86. Recent experimental data support theoretical results. 8 refs., 1 fig. (DWL)

48903 (DOE/ER/04052—105) Spin and temperature dependence of nuclear deformation using alpha-gamma angular correlations. Nicolis, N.G.; Sarantites, D.G.; Adler, L.A.; Dilmanian, F.A.; Honkanen, K.; Majka, Z.; Sobotka, L.G.; Li, Z.; Semkow, T.M.; Beene, J.R. (Washington Univ., St. Louis, MO (USA). Dept. of Chemistry; Oak Ridge National Lab., TN (USA); Texas A and M Univ., College Station (USA)). 1987. Contract AC02-76ER04052. 12p. (COO—4052-105; CONF-8706193—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014004.

From International conference on nuclear shapes; Crete, Greece (28 Jun 1987).

Alpha-particle angular distributions with respect to the spin direction of residual nuclei have been measured in heavy-ion fusion reactions. The spin direction was determined by measuring the γ-ray angular distributions, for each event, using the spin spectrometer. α-particle anisotropies have been extracted for the compound nuclear systems: ^{110}Sn*(94 MeV), ^{114}Sn*(80 MeV), ^{138}Nd*(82 MeV), ^{164}Yb*(67 MeV) and ^{170}Yb*(135 MeV) as a function of the α-particle energy and γ-ray multiplicity. The results are compared with statistical model calculations using transmission coefficients from a spherically symmetric optical model potential. The trend of the anisotropy coefficients below the evaporation Coulomb barrier is consistent with spherical emitting shapes in the case of the Sn* isotopes. Small deformation effects are suggested by the ^{138}Nd* and ^{164}Yb* data. The ^{170}Yb* data indicate a large deformation which increases considerably with increasing spin. These results are in agreement with findings for similar systems in which the decay of the giant resonances built on excited states have been studied. 16 refs., 5 figs.

48904 (DOE/ER/40334—1) Nuclear excitations and reaction mechanisms: Progress report: [1 August 1986-31 July 1987]. Fallieros, S.; Levin, F.S. (Brown Univ., Providence, RI (USA). Dept. of Physics). 1 Aug 1987. Contract FG02-87ER40334. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000063.

Completed and ongoing research includes various theoretical and numerical studies of few-nucleon systems; nuclear reaction models; photon scattering from nuclei, including sum rules and current conservation; and properties of the pion.

48905 (IAE—4281/2) Self-consistent description of magic nucleus properties by method of effective energetic functional of density. Smirnov, A.V.; Tolokonnikov, S.V.; Fayazov, R.F.; Fayans, S.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1986. 36p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87702895.

The principal characteristics of magic nuclei are calculated on the basis of simple energetic functionals of density with introduction of finite-range pair forces but only if the nucleon effective mass equals the void mass. It is shown that in such an approach binding energies, charge and mass distributions, as well as one-particle spectra can be decribed with approximately the same accuracy as in the quasi-particle Lagrange method providing a good agreement with the experimental data. 31 refs.; 14 tabs.

48906 (INDC(HUN)—023/L) Exciton cascade model for fast neutron reactions. Schram, Z.; Kluge, G.; Sailer, K. (International Atomic Energy Agency, Vienna (Austria). International Nuclear Data Committee). Jun 1987. 27p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703268.

A more sophisticated version of the exciton cascade model, treating equilibrium and pre-equilibrium particle emissions in a unique way has been developed and applied to the description of neutron induced reactions, using realistic input data. The master equation describing the nuclear relaxation process has been solved by Monte-Carlo method. The role of Pauli's exclusion principle and different estimates of the transition matrix elements between different exciton configurations are discussed. The model is free of any adjustable parameter. Good agreement of the results of calculations with experimental data has been found for some medium and heavy nuclei. 36 refs, 14 figs.

48907 (INIS-SU—412, pp 12-16) **On a calculation of nucleon knock-out cross sections in a collision of relativistic nuclei.** Goryachev, B.I.; Lin'kova, N.V. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780177.

Kratkie Soobshcheniya po Fizike.; (no.7).

In Experimental and theoretical physics. Collection.

It is shown that in the framework of the two-stage model one can obtain knock-out cross sections of the given number of nucleons from the nucleus-target at a certain number of nucleons knocked out from the nucleus-projectile. The first stage is consid-

ered as a fast process of nucleon collisions of interacting nuclei which is completed with knock out of one or several nucleons. The second stage-comparatively slow - is related to de-excitation of nuclei-fragments. 4 refs.; 1 fig.; 1 tab.

48908 (INIS-SU—412, pp 40-43) **Application of the eikonal expansion method for description of intermediate energy hadron-nucleus interaction.** Zavarzina, V.P.; Stepanov, A.V. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780177.

Kratkie Soobshcheniya po Fizike.; (no.7).

In Experimental and theoretical physics. Collection.

In the framework of the optical model in the first approximation of the "eikonal expansion" the calculation of forward scattering amplitude total cross sections for intermediats energy neutrons and protons on nuclei with A from 40 to 208 is performed. The values obtained are compared with the results of precise calculations. It is shown that the first approximation of the "eikonal expansion" proves to be the adequate method of characteristics calculation of intermediate energies with nuclei. 9 refs.; 2 figs.

48909 (INIS-SU—412, pp 44-48) **Calculation of reaction cross sections and scattering amplitude at the zero angle for nucleons and antinucleons of mean energies on nuclei.** Zavarzina, V.P.; Stepanov, A.V. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780177.

Kratkie Soobshcheniya po Fizike.; (no.7).

In Experimental and theoretical physics. Collection.

Within the framework of the optical model σ/sub T/ total cross section, σ/sub R/ reactions cross section and the real part of scattering amplitude at the ReF/sub N/(0) zero angle for nucleons and antinucleons of mean energies are calculated. It is shown that ReF/sub N/(0) values are more sensitive to variations of optical potential than σ/sub T/ and σ/sub R/. 10 refs.; 2 tabs.

48910 (INIS-SU—412) **Experimental and theoretical physics. Collection.** (AN SSSR, Moscow. Fizicheskij Inst.). 1985. 61p. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780177.

Kratkie Soobshcheniya po Fizike.; (no.7).

Separate abstracts were prepared for individual papers in this collection. (DWL)

48911 (INIS-SU—415, pp 25-29) **Elastic electron scattering at high momentum transfer and the quark structure of /sup 4/He.** Burov, V.V.; Luk'yanov, V.K.; Martines, R. (Joint Inst. for Nuclear Research, Dubna, USSR. Lab. of Theoretical Physics; Gavanskij Universitet). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178. (N—18-86).

In JINR rapid communications. Collection.

The /sup 4/He form factor is investigated within the model where the wave function includes both the nucleon and multiquark admixtures. It is shown that to explain experimental data, one needs 18 % of the 6q-admixture and 1 % of the 9q one. An estimation is done for the 12q-admixture of the level 0.02 %. Contributions of the 6q-, 9q- and 12q-form factors are smaller because of interference of the nucleon and quark channels and their values are 7, 0.8 and 0.01 %, respectively. 8 refs.; 3 figs.

48912 (INIS-SU—415, pp 30-36) **Spin-orbital effects in resonance and potential scattering of p-wave neutrons.** Popov, A.B.; Samosvat, G.S. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178. (N—18-86).

In JINR rapid communications. Collection.

Summary of neutron force functions S/sup 0/, S/sub 1/2//sup 1/, S/sub 3/2//sup 1/ and potential scattering parameters R/sub 0//sup ∞/, R/sub 1//sup ∞/ determined by a new method from the analysis of differnetial cross sections of elastic neutron scattering is given for nuclei with $48 \leqq A \leqq 144$. Consistency of S/sup 0/, S/sup 1/, R/sub 0//sup 1/ evaluations with the recommended data from "Neutron cross sections" by Muhabhaba et al is demonstrated and spin-orbital splitting of 3p maximum of neutron strength function is confirmed. It is shown by means of polarization data that in p-wave neutron scattering the spin-orbitaleffect, which agrees qualitatively with experimental splitting of strength functions, is revealed as well. 14 refs.; 5 figs.; 1 tab.

48913 (INIS-SU—416, pp 41-47) **Large cluster transfer processes in reactions leading to heavy actinides.** Magda, M.T.; Pop, A.; Sandulescu, A. (Institutul de Fizica si Inginerie Nucleara, Bucharest, Romania; Joint Inst. for Nuclear Research, Dubna, USSR. Lab. of Theoretical Physics). 1986. NTIS (US Sales Only), PC A04/MF A01. File Number DE87780179. (N—17-86).

In JINR rapid communications. Collection.

A model based on projectile fragmentation is proposed of describe the multinucleon transfer reactions leading to heavy actinides. The primary values of the cross sections for the formation of various isotopes are obtained by assuming that large clusters separated from the projectile are captured by the target. Data obtained for the Fm-, Md-, No-, and Lr-isotopes produced in the /sup 16/O, /sup 18/O, /sup 22/Ne, /sup 48/Ca + /sup 254/Es reactions are well described by the above model after correction for neutron emission. 12 refs.; 4 figs.

48914 (INIS-SU—417, pp 43-46) **On the forward scattering amplitude for hadron-nucleus optical potentials.** Belyak, V.I. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

Quasiclassical expressions for forward scattering amplitude and total scattering cross-section are obtained using hadron-nucleus optical potentials with a strong edge absorption. The above-mentioned expressions are used in pion, kaon and antinucleon scattering on nuclei (i.e., in case of strong absorption). 3 refs.

48915 (INIS-SU—418, pp 32-34) **On a possibility of narrow dibaryon production in gamma-quanta scattering on nuclei.** Fil'kov, L.V. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780180.

Kratkie Soobshcheniya po Fizike.; (no.11).

In Plasma physics. Collection.

Gamma-quanta scattering on nuclei is shown to be used in search for narrow nonstrange dibaryons and to estimate six-quark cluster contribution to nuclei. Mechanisms of elastic and inelastic (with break up or 6q-cluster production) gamma-quantum scattering on deuterium are considered. 4 refs.; 2 figs.

48916 (INS—595) **Lateral ejection of low energy protons in high energy heavy-ion collisions.** Kitazoe, Y.; Toki, H.; Yamamura, Y.; Nagamiya, S.; Sano, M. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jul 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702920.

The lateral ejections of low energy protons in E/sub L/ = 0.8 GeV/nucleon A + A collisions are systematically studied in terms of the nuclear cascade model, from the viewpoint of the mass number and charge-multiplicity dependences. The double differential cross sections for low energy (E/sub c/ < 100 MeV) protons indicate the peaking behavior around θ/sub c/ = 90 deg in higher multiplicity events than M = 60. The cascade model without the nuclear compressional effect can cause the lateral ejection of low energy protons in the higher multiplicity events, where the nucleons in the participant region are solely responsible for this ejection. High-density nucleons are formed in La + La central collisions, while Ar + KCl central collisions give only small disturbances to the nuclei. The energy spectra of laterally ejected protons have a very strong time-dependence in La + La central collisions.

48917 (INS—599) **Recent experiments on photonuclear reactions at the Tokyo 1.3 GeV electron synchrotron.** Kato, S.; Okuno, H. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jul 1986. 10p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702923.

The present status, recent experimental results and plans for the near-term future of the Tokyo 1.3 GeV electron synchrotron are reviewed briefly. In the past two years, the main experimental

activity was around photo-nuclear reactions on deuteron, helium and other nuclei. Recently, a new tagged and polarized photon beam channel has been installed, which is expected to improve substantially the quality of experiments.

48918 **(INS—604) Is the saddle-point-method a proper approximation for nuclear level density?.** Sato, Hiroshi. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Sep 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702927.

The nuclear level density is formulated and studied in terms of the antisymmetrized temperature dependent density matrix of many fermions in a harmonic oscillator well. Experimentally observed characteristic features of nuclear level density are reproduced. In addition the excitation energy dependence of the level density parameter a is found. The relationship between this treatment and a conventional level density formula is discussed.

48919 **(IPNO-DRE—86-22) Neighbouring charge fragmentations in low energy fission.** Montoya, M. (Paris-11 Univ., 91 - Orsay (France). Inst. de Physique Nucleaire). Oct 1986. 11p. (CONF-8610289—1). NTIS (US Sales Only), PC A02/MF A01. File Number DE87752583.

From Fission meeting; Arcachon, France (14 Oct 1986).

Shell and odd-even effects in fission have been largely studied until now. The structure in fragment mass, charge and kinetic energy distributions of fragments were interpreted as shell and even-odd effects. In this paper, we want to show that the discret change of fragment charge symmetry should produce also structures in those distribution. 19 refs.

48920 **(IPNO-TH—86-51) About nucleon-nucleon potential: meson exchange currents and relativistic approach of nuclear structure.** Mathiot, J.F. (Paris-11 Univ., 91 - Orsay (France). Inst. de Physique Nucleaire). Jun 1986. 194p. (In French). NTIS (US Sales Only), PC A09/MF A01. File Number DE87752342.

Various aspects of nuclear physics at intermediate energies, in connection with the description of the nucleon-nucleon potential in terms of mesons, are presented in this thesis. The meson exchange current contribution is studied in the case of the deuteron (np capture and electrodisintegration near threshold). A consistent description of these processes is discussed, with particular emphasis on the effective range of the current, for momentum transfers as large as q/sup 2/~1 (GeV/c)/sup 2/. The structure of finite nuclei and nuclear matter is then analysed in the framework of a relativistic formalism, in which the negative energy component of the nucleon wave function is explicitly taken into account. The nuclear matter saturation mechanism is studied in details and compared with the non-relativistic limit. Properties of finite nuclei are also discussed. Finally, the structure of the nucleon itself in the nuclear medium is investigated. A connection between the polarisation of the nucleon (three valence quark component), the incompressibility parameter and the mass of the first monopole excitation of the nucleon is presented.

48921 **(ITEF—86-1986) Fast hadron energy losses by excitation of nuclear matter.** Gavrilov, V.B.; Leksin, G.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703276.

A concept of deep inelastic hadron-nuclear reactions as a series of local interactions of a fast hadron with nuclear matter permits to introduce a notion of hadron specific energy losses by nuclear matter excitation. Due to nuclear scaling this value does not depend on the energy and type of an incident particle. The estimations made on the basis of experimental data on inclusive particle spectra in the nuclear fragmentation range, as well as regularities of approximation to limiting fragmentation for different nuclei lead to the value of hadron specific energy losses in the nuclear matter of about 1 GeV/fm. 29 refs.

48922 **(ITEP—69-1985) Deuteron production and space-time characteristics of high-energy hadron-nucleus reactions.** Gavrilov, V.B.; Kornienko, N.L.; Leksin, G.A.; Semenov, S.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 12p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703307.

A contribution of the coalescence to deuteron production is discussed on the basis of data on inclusive deuteron and proton production in hadron nucleus interactions. Angular dependence and A-dependence of the coefficient of two nucleon coalescence into a deuteron are analysed for 7.5 GeV/c pA and 5 GeV/c π/sup -/A interactions. The results suggest the shape of the interaction region extended alons the trajectory of the incident hadron and a successive knock-out of nucleons during propagation of the incident particle through a nucleus propagation of the incident particle through a nucleus. 24 refs.; 4 figs.

48923 **(ITEP—98-1985) Transparency, stopping power and thermalization of nuclear matter in the Ca+Ca and Nb+Nb reactions at E/A=400 MeV: classical equation of motion approach.** Kiselev, S.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 11p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702945.

Recent charged-particle exclusive data for Ca+Ca and Nb+Nb collisions at E/A=400 MeV are analyzed on the basis of the classical equation of motion model. The model reproduces the very small variation of the deflection of the projectile fragments as a function of multiplicity. The simulated head-on events demonstrate the lack of transparency although in the case of Ca+Ca the complete nuclear stopping is absent. In the central Ca+Ca collisions the thermalization inside the compression zone is not realized on the average whereas in the case Nb+Nb it takes place probably only at the end of zone life. 6 refs.; 5 figs.

48924 (JINR—D-4-85-851, pp 8-26) **Quasiparticle-phonon nuclear model.** Solov'ev, V.G. 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Main statements of the nucleus quasiparticle-phonon model (NQPPM) are described. NQPPM hamiltonian is built on the basis of the approximate solution of the nuclear many-body problem. The hamiltonian consists of the average field of neutron and proton systems in the form of Saxon-Woods potentials and interactions leading to pair correlations of the superconducting type. It is substantially that the interaction between quasiparticles is presented in a separable form. Peculiarities and advantages of NQPPM are marked. The general calculation procedure in NQPPM is given. NQPPM application for description of fragmentation of charge-exchange resonances in spherical nuclei and vibrational low-lying states in even-even deformed nuclei is considered. The conclusion is made that in the framework of NQPPM one can calculate many properties of complex nuclei at low, high and mean excitation energies. The fact that in NQPPM it is possible to obtain with a unique set of parameters good description of just a lot of nuclear characteristics in quite a wide range of excitation energy has shown that NQPPM covers correctly main features of the nuclear many-body problem. 52 refs.; 4 figs.

48925 (JINR—D-4-85-851, pp 27-50) **Single-particle motion in spherical nuclei at high excitation energies.** Stoyanov, Ch.; Vdovin, A.I.; Voronov, V.V. (Bylgarska Akademiya na Naukite, Sofia. Inst. za Yadrena Izsledvaniya i Yadrena Energetika; Joint Inst. for Nuclear Research, Dubna, USSR). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The purpose of the lecture is to look to the properties of the single-particle motion at low and high excitation energies. The examples pointed out will be based mainly on the studies within the

quasiparticle-phonon nuclear model (QPM). In recent years the model has been successfully applied to study the properties of the excited states in spherical and deformed nuclei. An impression about the mathematical frameworks of the QPM for the odd spherical nuclei is given. Some properties of the single-particle states in the average nuclear field are discussed. Based on the selected examples an impression how the single-particle states influence the behaviour of the complex quantities such as B(M2)-values and neutron strength functions is given. The description of the spreading widths of the high-lying single-particle (or hole) modes in the odd spherical nuclei is discussed. Some new results and predictions of the model and also comparison with the other theoretical approaches is presented. 50 refs.; 10 figs.

48926 (JINR—D-4-85-851, pp 104-123) **Spin modes.** Gaarde, C. (Niels Bohr Inst., Copenhagen, Denmark; Copenhagen Univ., Denmark). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The charge-exchange (p, n), (/sup 3/He, t), (d, 2p) reactions and the heavy ion charge exchange at intermediate energies and targets with A=12-208 are studied. It is noted that this reactions as a step process certainly. The energy spectra of final nuclei and angular distribution are given. The Δ-resonance energy in nuclei is considered. This reactions very selectively s isospin-spin modes of target-nucleus. 29 refs.; 18 figs.

48927 (JINR—D-4-85-851, pp 140-152) **On triplet pairing in nuclei.** Shapiro, I.S. (AN SSSR, Moscow. Fizicheskij Inst.). 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The triplet Cooper pairing (TCP) (spin of pairs S=1) in nuclei is considered. Two groups of qualitative consequences of TCP are marked: enrichment of the collective excitation spectrum and anisotropy of the triplet superfluid liquid (a drop of nuclear liquid). Enumeration of possible six superfluid phases in nuclei with TCP and strong spin-orbit coupling is given. The conclusion is made that there are physical causes for the presence of, at least, seven bad intercombining collective modes of the Cooper bose condensate types corresponding to singlet and triplet pairing in the nuclear spectra. There must be a band of good intercombining between each other levels including one- and two-quasiparticle ones over the lowest energy state in each mode. Two-slit spectrum, characterized by M1-transitions between neighbouring components of multiplet and the specific rule of intervals, may be used for the identification sign of the condensate nature for such quasiparticle excitations. It is clear that collective excitations are also possible in each phase besides quasiparticle ones. 8 refs.; 3 figs.

48928 (JINR—D-4-85-851, pp 153-172) **Microscopic foundation of the interacting boson model.** Barrett, B.R. (National Science Foundation, Washington, DC, USA). 1985. NTIS (US Sales Only), FC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The development of the proton-neutron interacting boson model (IBM) (IBM-2) has allowed a connection to be established with the microscopic nuclear shell model. The procedure, by which one relates the microscopic structure of the boson to the underlying fermion degrees of freedom, is generally referred to as the interacting boson approximation (IBA). The IBA can be viewed as a truncation of the fermion shell model to some small set of collective configurations, which can be related to the s and d bosons. It is found that the neutron-proton IBM (IBM-2) is possible understood as a wave-function truncation of the fermion shell-model space to a few, important collective degrees of freedom. By performing a Marumori mapping of either generalized-seniority or coherent fermion states into corresponding boson states the IBM-2 parameters by equating fermion and boson matrix elements are calculated. The lowest-order SD-space results were found to be inadequate, particularly for well-deformed nuclei, because of the emission of Pauli effects and of degrees of freedom outside the SD space, such as G pairs. Finally it is found that by including G pairs in the coherent-state configurations and by renormalizing the boson operatos (e.g., the boson Hamiltonian) for Pauli effects and for the influence of the g boson that quite reasonable agreement can be obtained with the empirical IBM-2 parameter values. Whether or not other degrees of freedom outside the SD space, besides the G pair, play an important role in determining the structure of the sd boson Hamiltonian is still an open question. 66 refs.; 2 figs.

48929 (JINR—D-4-85-851, pp 173-196) **Boson models of quadrupole collective motion. New about old.** Zelevinskij, V.G. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki). 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The subject of the lecture is the low-lying excitations of even-even (e-e) spherical nuclei. The predominant role of the quadrupole mode, which determines the structure of spectra and transitions, is obvious on the background of shell periodicity and pair correlations. Typical E2-transitions are strengthened Ω — A/sup 2/ 3/ times in comparison with single particle evaluations. Together with the regularity of the whole picture it gives evidence about collectivization of quadrupole motion. The collective states are combined in bands, where the transition probability are especially great; frequencies ω of the strengthened transitions are small in comparison with pair separation energies of 2 E-bar — 2 MeV. Thus, the description of low-lying excitations of spherical nuclei has to be based on three principles: collectivity (Ω >> 1), adiabaticity (tau ident to ω/2E-bar << 1) and quadrupole symmetry. 47 refs.; 8 figs.

48930 (JINR—D-4-85-851, pp 197-207) **Mean field techniques in the interacting boson model.** Dobes, J. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Essential ideas of application of the mean field techniques to interacting boson model (IBM) are shortly reviewed. The effects of angular momentum projection before variations are studied. Collective K=1/sup +/ states in the neutron-proton IBM (IBM-2) are studied; the IBM-2 within the mean field theory are discussed. The exact IBM-2 results are compared with approximate IBM calculations on the example of 1/sup +/ state energy and probability B(M1) for Gd isotopes. The importance of angular momentum projection is shown. 24 refs.; 2figs.

48931 (JINR—D-4-85-851, pp 208-219) **MONSTER studies of nuclear structure problems.** Faessler, A. (Tuebingen Univ., Germany, F.R. Inst. fuer Theoretische Physik). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Nuclear structure calculations are in prnciple simple: one chooses a model space defined by a few oscillator single-particle states. If one gets from somewhere the single-particle energies and the effective force for this model space one diagonalizes the many-body Hamiltonian in all possible configurations which one obtains by distributing the protons and the neutrons over the single-particle states. This approach has only one difficulty: the number of configurations is growing astronomically. The way out of this difficulty which authors are proposing is a Model for Number and Spin projected Two-quasiparticle Excitations with Realistic forces (MONSTER). The idea was to choose optimal quasiparticle states and build from these the Hartree-Fock-Bogolubov (HFB) wavefunction as a reference configuration. The angular momentum and particle number projected zero and quasiparticle state of this reference HFB wave function serves as a basis to diagonalize the many-body Hamiltonian. MONSTER has difficulties if the nature of the states changes by more than two quasiparticles relative to the HFB intrinsic reference state. This is for example the case for the second backbending in the rare earth nuclei which is due to the alignment of a h/sub 11/2/ proton pair. To describe such effects the Variation

of the single quasiparticle degrees of freedom After Mean field Projection In Realistic model spaces (VAMPIR) has performed. It is shown that one single-quasiparticle Slater determinant of VAMPIR is describing the yrast states practically equally well as the MONSTER approach. 25 refs.; 10 figs.

48932 (JINR—D-4-85-851, pp 220-235) **Equation of motion method to describe quasiparticle structures in transitional and deformed nuclei.** Doenau, F. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The development of the experimental techniques will supply one with more and more complete level schemes and transition matrix elements. This is a great challenge for the theorists to put the right questions and to work out the models accordingly. In this respect the method of equation of motion (EQM) seems to be a suitable approach the inherent possibilities of which are yet not fully explored. The EQM is sketched for the case of one-quasiparticle (1qp) excitation in odd-mass nuclei. The coupling of a particle to the quasrupole and pair field is treated using the IBA for the collective degrees of freedom. Physical implications are shortly discussed. The selfconsistent aspects of the theory are considered. A perturbational treatment is proposed to construct the physical subspace that is necessary to perform selfconsistent calculations of the collective core energies. The EQM is formulated for the two-quasiparticle (2qp) excitations in transitional nuclei inclusive the coupling to the collective excitations (0 qp space). EQM can be widely applied to describe the complicated interplay between collective degrees of freedom and quasiparticle configurations are concluded. 12 refs.

48933 (JINR—D-4-85-851, pp 236-244) **Macroscopic description of the collective motion in fast rotating nuclei.** Bal'butsev, E.B.; Mikhajlov, I.N. 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Application of mathematical methods developed in the theory of self-gravitating masses to solve the equations of the Fermi surface deformation (FSD) model allow to generalize the FSD model to rotating nuclei and extend the class of the phenomena described. Formalism of the FSD model, as well as the results studying the form of rotating nuclei and their oscillations: giant quadrupole resonance, giant octupole resonance, giant dipole resonance and bound to these resonances low-lying modes, are briefly described. 17 refs.; 4 figs.

48934 (JINR—D-4-85-851, pp 245-259) **Alignment effects and stable octupole deformation in the actinides.** Briancon, Ch.; Mikhajlov, I.N. (C.S.N.S.M. Orsay; Joint Inst. for Nuclear Research, Dubna, USSR). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Explicit relations between the alignment of the intrinsic octupole momentum and a new type of deformation which does not conserve the axial symmetry are established. It seems that such an octupole deformation of the nuclear shape is indeed a general property of nuclear high spin states, whatever may become the axial octupole shape with increasing rotational frequency. However the nature seems to be reticent to show such properties easily and fortunately there exists shell-effects which allow to study them at low spin but only in some exceptional cases. One should push forwards both theory and experiments in this field. From the experimental point of view, one may expect much from the new multidetection techniques although one must overcome the experimental difficulties arising from the high rate of fission products in the (HI, xn) reactions. 25 refs.; 11 figs.

48935 (JINR—D-4-85-851, pp 321-341) **Phase space in nuclear dynamics.** Toro, M. (Catania Univ., Italy. Ist. di Fisica; Istituto Nazionale di Fisica Nucleare, Catania, Italy). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

A semiclassical phase space approach to the nuclear dynamics, based on fully microscopic foundations, is presented. The starting point in the nuclear Vlasov equation derived from a phase space representation, through the Wigner transform of the density matrix, of a mean field theory like the time-dependent-Hartree-Fock (TDHF) approach. The TDHF method and its linearized version, RPA, both suffer from the drawback of being computationally very complicated and consequently not much transparent in the results. Some results for small amplitude nuclear collective motions obtained from the study of a linearized version of the nuclear Vlasov equation are shown. The solution discussed in the first part corresponds to scaling deformation modes of very collective nature where all the nucleons are moving together with distortions in momentum distribution maximum of quadrupole type. It is shown that these collective states correspond to giant resonances. In particular isovector giant dipole motions are discussed. A relevant feature of this semiclassical approach is that can be easily studied giant resonances built on any reference nuclear state. It will be used this to show how quantum fluctuations due to isovector giant dipole modes of a dinuclear system can account for the fragment charge variances in deep inelastic collisions. 31 refs.; 8 figs.

48936 (JINR—D-4-85-851, pp 124-139) **Spin excitations in nuclei.** Gareev, F.A.; Ershov, S.N.; Pyatov, N.I.; Fayans, S.A. (Joint Inst. for Nuclear Research, Dubna, USSR; Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The theoretical papers devoted to the analysis of experimental data on spin excitations in nuclei at low energy transfers and momentum transfer are reviewed. Excitation of spin-isospin nuclear states in charge-exchange reactions (p, n), (/sup 3/He, t), (/sup 6/Li, /sup 6/He) on /sup 48/Ca, /sup 90/Zr, /sup 208/Pb nuclei is considered. The values of energy, probability and differential cross sections of excitation of M1 giant resonances of the above nuclei in (p, p) reactions at 201 MeV are given. The conclusion is made that the experimental data on spin excitations in nuclei accumulated by now can be described consistently within the framework of simple theoretical representations on the nuclear structure and the mechanism of nuclear reactions. 55 refs.; 4 figs.

48937 (JINR—D-4-85-851, pp 260-282) **Radiative capture of protons by medium nuclei and γ-ray strength functions.** Wilhelmi, Z. (Warsaw Univ., Poland). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The vast amount of data on γ-ray spectra from the (p,γ) reactions in nuclei $50<A<90$ shows that the Lorentzian extrapolation of the giant dipole resonance (GDR) gives a much better fit to the observed E1 strength functions than the single particle model of Weisskopf. However the A-dependence of these radiative strength functions does not conform to Axel's predictions and seems to reveal the shell effects. The single particle model which predicts the A-dependence to be A/sup 2/3/ is also not adequate. The studies of the GDRs built on excited states have brought a proof of the Brink-Axel hypothesis and have shown that the (p, γ) reactions can be used to determine the spectroscopic factors of low-lying states in medium-mass nuclei but it is necessary to account here for the occurrence of both the DSD and CN mechanism in the investigated reaction. 56 refs.; 21 figs.

48938 (JINR—D-4-85-851, pp 283-294) **Multiquark systems and the lightest nucleus form factors.** Burov, V.V.; Luk'yanov, V.K. 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Development of multiquark systems in the form factors of the lightest nuclei D and /sup 3/He is considered. Account of the meson exchange current contribution leads to the reduction of 6q-impurity contribution to form factor D. The assumption that 6q- and 9q-systems exist in /sup 3/He allows to describe /sup 3/He form factor in the whole region of momenta measured and transfered, taking into account the interference of channels. The table for probability values of 6q- and 9q-impurities in D and /sup 3/He, obtained during the analysis of different processes, is given. Qualitative agreement of the given probabilities between each other is marked. 36 refs.; 9 figs.

48939 (JINR—D-4-85-851, pp 304-320) **Heavy ion collisions: kinetic energy damping, nucleon emission.** Dzholos, R.V.; Ivanova, S.P. 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

The model for the description of heavy ion (HI) collisions is formulated. The collective hamiltonian, describing relative motion of colliding nuclei, their internal motion and the relation between relative motion and internal one, is constructed. It can be used both for the description of deep inelastic collisions of HI, and for the analysis of change in the internal state of colliding nuclei. The theoretical calculations of nucleon yield are obtained from the calculations of statistic nucleon and pre-equilibrium particle emission at the initial stage of the reaction. In the suggested model the main mechanism of kinetic energy dissipation is single-particle. The dependence of cross section of evaporated neutrons on the parameters of the statistical model has been investigated. Experimental data on the yield and energy dependence of cross section are reproduced in calculations. The angular anisotropy is qualitatively reproduced in calculations. Escape of nonequilibrium nucleons from a projectile particle is discussed. But high-energy neutron emission from the nucleus-target is possible. Therefore at total account the qualitative agreement can be improved. Closeness of numerical results to experimental ones gives the foundation for the statement that the supposed mechanism of nonequilibrium nucleon escape describes one of the sources of high-energy particle emission. 27 refs.; 8 figs.

48940 (JINR—D-4-85-851, pp 342-351) **Microscopic approach to transfer reactions and surface clustering in heavy nuclei.** Catara, F.; Insolia, A.; Maglione, E.; Vitturi, A. (Catania Univ., Italy. Ist. di Fisica; Istituto Nazionale di Fisica Nucleare, Catania, Italy). 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

One of the most interesting subjects in nuclear spectroscopy has been the study of two- and four-particle transfer reactions. While the possibility of reproducing the absolute value of the α-transfer cross section between heavy ions is an open question, that it is possible to account, in a quantitative way, for the trend observed in relative cross sections have been shown. The properties observed in two- and four-nucleon transfer reactions leading to the Zr isotopes can be understood in terms of the pairing vibrational model and determining the structure of the modes from one-particle stripping and pick-up reactions. Relative cross sections are also reproduced in (/sup 16/O, /sup 12/C) reactions. The comparison with the corresponding ones in (/sup 6/Li, d) reactions shows that the relative population of the different final states can be rather different in the two processes. As far as surface clustering is concerned, the pairing interaction leads, in the case of a spherical nucleus, to pairs of valence particles which are localized more closely on the nuclear surface than uncorrelated pairs are concluded. This should be responsible for larger transfer cross sections. Also in the case of deformed nuclei the inclusion of the pairing interaction leads to a large enhancement of the two- and four-particle surface clusterization and to an almost uniform distribution of the cluster probability over the nuclear surface. This is at variance with the case of particles moving in pure Nilsson orbits which are characterized by cluster probability distribution smaller in absolute value but strongly localized in space. 17 refs.; 6 figs.

48941 (JINR—D-4-85-851, pp 352-364) **New modes of nuclear decay.** Ogloblin, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

New forms of nuclear decays detected lately: nucleon radioactivity, radioactivity with escape of nuclei, which are heavier than α-particles, and two-nucleon decay, are briefly described. Escape of protons is far from the main form of decay, at first α decay, spontaneous fission and light nucleus escape occur. Neutron-decay nuclei are determined only in the region of the lightest nuclei. Radioactive decay with complex nuclei escape represents a new phenomenon, occupying the intermediate position between α-radioactivity and fission. One of the main forms of nuclear decay, being on the stability boundary, can be two-nucleon decay. The first data on the escape of a diproton and dineutron at decay of the fixed nucleus state are obtained. 22 refs.; 9 figs.

48942 (JINR—D-4-85-851, pp 385-398) **Microscopic approach to description of heavy-particle decay of nuclei.** Kadmenskij, S.G.; Furman, V.I.; Chuvil'skij, Yu.M. (Voronezhskij Gosudarstvennyj Univ., USSR; Joint Inst. for Nuclear Research, Dubna, USSR; Moskovskij Gosudarstvennyj Univ., USSR. Nauchno-Issledovatel'skij Inst. Yadernoj Fiziki). 1985. (In Russian). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

A new form of radioactivity - nuclear decay in ground states with escape of particles heavier than /sup 4/He, is considered in the framework of the approach developed by authors. The approach is the generalization of the α-decay theory variant describing successfully relative and absolute probabilities of α-transitions based on nuclear shell model with configuration mixing. The results of calculations of spectroscopic factors, decay widths, decay energy for /sup 222,223,224,/ Ra decays with /sup 14/C emission, for /sup 232,233/U nuclei with /sup 24,25/Ne emission, and for /sup 231/Ra with /sup 24/Ne emission are presented. Data on α-decay of these nuclei are given for comparison. The conclusion is made that the approach developed is physically equivalent to the phenomenon studied and has the heuristic force. 22 refs.

48943 (JINR—D-4-85-851, pp 365-384) **Fission decay modes with compact shapes, heavy clusters emission and the superheavy nuclei.** Sandulescu, A. 1985. NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001. (CONF-8510458—).

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

A new decay mode is predicted for the very heavy elements in which a nearly symmetric fragmentation with compact shapes takes place. The experimental observed total kinetic energy (TKE) distributions of fission fragments for /sup 258/Fm, /sup 259/Md, /sup 260/Md and /sup 258/No peaked either at low TKE (— 200 MeV) or high TKE (— 235 MeV) together with the very narrow symmetric mass distribution for high TKE and asymmetric mass distribution for low TKE are interpreted as evidences of such a decay mode. The proposed mechanisms can be distinguished from the spontaneous fission by coincidents measurements of fission fragments associated with no neutrons and no γ or low energy and low multiplicity γ-rays. Branching ratios of the predicted decay mode versus spontaneous fission are given which indicate that superheavy nuclei around N=164 have half lifes shorter than ms. Allso, it is shown that, if one treat the new decay modes as emission of heavy clusters one expect large enhancements due to the appearance of a pocket in the selfconsistent potential together with large hindrance factors due to the change of the deformation between the initial

and final states which make the evaluations of the half-lifes analogous with alpha decay meaningless. 9 refs.; 8 figs.

48944 (JINR—D-4-85-851) Nuclear structure. Proceedings of the International School on Nuclear Structure. Solov'ev, V.G.; Popov, Yu.P. (eds.). (Joint Inst. for Nuclear Research, Dubna (USSR)). 1985. 412p. (CONF-8510458—). NTIS (US Sales Only), PC A18/MF A01. File Number DE88780001.

From International school on nuclear structure; Alushta, Ukrainian SSR (14 Oct 1985).

Individual papers in these proceedings were separately indexed. (LEW)

48945 (JINR-E—1-86-643) Characteristics of atomic nuclei employed as targets in high-energy nuclear collisions. Pawlak, T.; Perut, W.; Srugalska-Gola, E.; Miller, K.; Stugalski, Z. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy). 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703315.

Values determining the properties of atomic nuclei used as targets in nuclear collisions are presented. Average and maximum thicknesses of nuclear substance layers involved in the collisions at different impact parameters are calculated. The calculation is made for 24 atomic nuclei: ^{12}C, ^{14}N, ^{16}O, ^{19}F, ^{20}Ne, ^{27}Al, ^{28}Si, ^{32}S, ^{40}Ar, ^{52}Cr, ^{54}Fe, ^{59}Co, ^{64}Cu, ^{65}Zn, ^{73}Ge, ^{80}Br, ^{108}Ag, ^{127}J, ^{131}Xe, ^{181}Ta, ^{184}W, ^{197}Au, ^{207}Pb, ^{238}U. Tables containing the calculation results are presented. The tables are to be used when analyzing data on hadron-nucleus and nucleus-nucleus collisions. 12 references, 1 table.

48946 (JINR-E—4-86-396) Role of quasiparticle x phonon components in gamma-decay of high-lying states. Ponomarev, V.Yu.; Solov'ev, V.G.; Vdovin, A.I.; Stoyanov, Ch. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 8p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703317.

Submitted to the journal Phys. Lett., B.

In the framework of quasiparticle-phonon model of a nucleus the probabilities of gamma-transitions (E1, M1, E2) from a high-lying resonance-similar structure to the excitation of neutron hole state $(lg_9 2/)^{-1}$ of ^{111}Sn nucleus to the main and low-excited one-quasiparticle states have been calculated. Wave function of a highly excited state comprised the components quasiparticle x phonon and quasiparticle x two phonons. For E1-transitions $9/2^+ \rightarrow 11/2_1^-$ the main contribution to the transition is made by one-quasiparticle components of wave functions of the initial and final states. E2-transition $9/2^+ \rightarrow 7/2/\text{sub g,s/}^+$ takes place at the expense of impurities in quasiparticle x phonon states. For M1-transition from the states $9/2^+$ to the main one a strong destructive interference of contributions of one-quasiparticle and quasiparticle x phonon components is observed. Thus it is shown that components quasiparticle x phonon may play the major role in correct description of gamma-transitions from high-lying one-particle or low-lying hole states. 11 references, 2 figures.

48947 (JINR-R—2-86-629) On the mechanism of relativistic deuteron fragmentation on nuclei. Ignatenko, M.A.; Lykasov, G.I. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703322.

Submitted to the journal Sov. J. Nucl. Phys.

Contribution of different mechanisms of relativistic deuteron fragmentation into protons are investigated. It is shown that for the total momentum spectrum description at the same time with stripping that gives the main contribution one should take into account the intermediate π-meson production processes followed by absorption or pion rescattering by spectator-nucleon which dominate in a definite kinematic region. A possible contribution of the six quark state into the deuteron wave function can manifest itself only at a high momentum part of the proton spectrum, where other mechanism contributions are negligible. 27 references, 5 figures.

48948 (KFTI—86-18) Deuteron inelastic scattering by electrons in rest, $d+e^- \rightarrow e^-+eta+p$. Akhiezer, A.I.; Rekalo, M.P. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703329.

A general structure of differential cross section of high energy deuteron disintegration in their scattering by target electrons, $d+e^- \rightarrow e^-+eta+p$, is determined. The differential cross section dependence on vector and tenzor polarization is estimated. By this, the mechanism of the reaction is not concretized and deuteron is considered as an elementary particle with unit spin and a positive space parity. The developed formalism allows to estimate the connection between the differential cross section of the deuteron electrodisitegration and the disinegration of relativistic deuterons by electrons in rest. 15 references, 3 figures.

48949 (LA-UR—87-2633) Three-body forces and the trinucleons. Friar, J.L. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 15p. (CONF-8706200—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014738.

From CEBAF summer workshop; Newport News, VA, USA (22 Jun 1987).

Three-body forces are discussed in the context of classical, atomic, solid-state and nuclear physics. The basic theoretical ingredients used in the construction of such forces are reviewed. Experimental evidence for three-nucleon forces and an overview of the three-nucleon bound states are presented. 53 refs., 9 figs.

48950 (LA-UR—87-2716) Nuclear dynamics of bound eta mesons: Eta-mesic nuclei and mesic compound-nucleus resonances. Liu, L.C. (Los Alamos National Lab., NM (USA)). Jun 1987. Contract W-7405-ENG-36. 13p. (CONF-8706166—3). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014726.

From International symposium on medium energy physics; Beijing, China (23 Jun 1987).

The theory of eta-mesic nuclei is reviewed and the experiments designed to search for them are described. A theory of mesic compound nuclear resonances is presented which allow a study of the effects of eta-nucleus bound states on other meson-nucleus reactions in which the eta is not being observed. 7 refs., 8 figs.

48951 (LA-UR—87-2925) Relativisitic hydrodynamics and heavy ion reactions. Strottman, D. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 8p. (CONF-8705189—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014743.

From Conference on relativistic fluids; Noto, Italy (1 May 1987).

The author discusses a hydrodynamic model for describing heavy ion reactions in which the three dimensional relativistic Euler equations are solved numerically using the particle in cell method. This method allows for calculations in cases of extreme distortion and shear and provides a means for presenting graphical representations of the reaction process. The techniques are illustrated by considering the $^{20}Ne + ^{238}U$ and the $^{238}U + ^{238}u$ reactions at 393 MeV and 800 MeV laboratory energies, respectively. 16 refs., 4 figs.

48952 (LYCEN—8575) RPA spin-isospin nuclear response in the deep inelastic region. Alberico, W.M.; Molinari, A.; De Pace, A.; Johnson, M.B.; Ericson, M. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). Nov 1985. 28p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752591.

The spin-isospin volume responses of a finite nucleus are evaluated in the RPA frame, utilizing a harmonic oscillator basis. Particular emphasis is given to the mixing between the longitudinal and transverse couplings, which arise at the nuclear surface. We show that it reduces somewhat the contrast between the two spin responses. We compare the calculated transverse response with the experimental one extracted from deep inelastic electron scattering.

48953 **(LYCEN—8610) Nuclear binding and quark confinement.** Chanfray, G.; Pirner, H.J. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). Mar 1986. 21p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752576.

We present a schematic solution of the color dielectric model for the nucleon and demonstrate how the nucleon can be bound in nuclear matter. The gluon field surrounding the bound nucleon is obtained from the linearized field equations of motion in the color dielectric. This schematic model of the baryon allows a comparison of the neutron and proton mass in the nucleus. We calculate the Nolen-Schiffer anomaly for several light nuclei.

48954 **(LYCEN—8614) Inclusive charge longitudinal response in finite nuclei.** Alberico, W.M.; Molinari, A.; Czerski, P.; Czerski, P.; Ericson, M. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). Mar 1986. 19p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752590.

The experimental dynamic and static longitudinal structure factors of /sup 12/C, /sup 40/Ca and /sup 56/Fe are investigated with a semiclassical RPA theory. The parameters entering into the nuclear mean field (including the nucleon effective mass) and in the isoscalar and isovector particle-hole forces are set by best fitting procedures. Quite reasonable values of these quantities allow a satisfactory account of the experimental data over a wide range of momentum transfers in all the three nuclei. However, to achieve this result, the proton root mean square radius has to be increased over the conventional value of about 13% in /sup 12/C and 22% in /sup 40/Ca and /sup 56/Fe.

48955 **(UCRL—97269) Nuclear stopping and energy deposition into the central rapidity region.** Zingman, J.A. (Lawrence Livermore National Lab., CA (USA)). 3 Aug 1987. Contract W-7405-ENG-48. 12p. (CONF-870543—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014345.

From 2. workshop on experiments and detectors for relativistic heavy ion collider; Berkeley, CA, USA (25 May 1987).

Nuclear stopping and energy deposition into the central rapidity region of ultrarelativistic heavy-ion collisions are studied through the application of a model incorporating hydrodynamic baryon flow coupled to a self-consistent field calculated in the flux tube model. Ultrarelativistic heavy ion collisions are modeled in which the nuclei have passed through each other and as a result are charged and heated.

48956 **(UCRL—97270) Relativistic nuclear fluid dynamics and VUU kinetic theory.** Molitoris, J.J.; Hahn, D.; Alonso, C.; Collazo, I.; D'Alessandris, P.; McAbee, T.; Wilson, J.; Zingman, J. (Lawrence Livermore National Lab., CA (USA); Muhlenberg Coll., Allentown, PA (USA). Dept. of Physics). 24 Aug 1987. Contract W-7405-ENG-48. 19p. (CONF-870543—6). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014352.

From 2. workshop on experiments and detectors for relativistic heavy ion collider; Berkeley, CA, USA (25 May 1987).

Relativistic kinetic theory may be used to understand hot dense hadronic matter. We address the questions of collective flow and pion production in a 3 D relativistic fluid dynamic model and in the VUU microscopic theory. The GSI/LBL collective flow and pion data point to a stiff equation of state. The effect of the nuclear equation of state on the thermodynamic parameters is discussed. The properties of dense hot hadronic matter are studied in Au + Au collisions from 0.1 to 10 GeV/nucleon. 22 refs., 5 figs.

48957 **Transfer reactions at high energy and ambiguities in heavy-ion potentials.** Horen, D.J.; Fernandes, A.A.G.; Satchler, G.R.; Burks, B.L.; Auble, R.L.; Bertrand, F.E.; Gross, E.E.; Hensley, D.C.; Sayer, R.O.; Shapira, D. (Oak Ridge National Lab., TN, USA). *Zeitschrift fuer Physik A: Atomic Nuclei;* **328**: No. 2, 189-193(Oct 1987). Contract AC05-84OR21400.

The smaller impact parameters that contribute to transfer reactions between heavy ions at high energies make them more sensitive to different types of optical potentials than is the case at lower energies. This may allow one to distinguish between potentials that otherwise generate similar elastic scattering cross sections within the limited angular region over which typical elastic data are available. We cite as evidence results for nucleon transfers induced by / sup 18/O+/sup 28/Si at 352 MeV which rule out surface transparent potentials.

48958 **Abundance and systematics of nuclear superdeformed states; relation to the pseudospin and pseudo-SU(3) symmetries.** Dudek, J.; Nazarewicz, W.; Szymanski, Z.; Leander, G.A. (Centre de Recherches Nucleaires et Universite Louis Pasteur, F-67037 Strasbourg Cedex, France). *Physical Review Letters;* **59**: No. 13, 1405-1408(28 Sep 1987).

Results of a multidimensional (β_2, γ, β_4, ω, Z, and N) search for nuclear superdeformed configurations are presented. Calculations based on a realistic deformed average field give a relatively strong dependence of the "super" elongation on the particle number. This dependence is shown to be a cyclic function of the particle number. It originates from the pseudospin and pseudo-SU(3) symmetries which are obeyed approximately in a realistic average field.

48959 **Pion double charge exchange and the nuclear shell model.** Auerbach, N.; Gibbs, W.R.; Piasetzky, E. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **59**: No. 10, 1076-1079(7 Sep 1987).

The theory of analog pion double charge exchange on semimagic even-even nuclei is examined from the point of view of the nuclear shell model. It is shown that the amplitude for the reaction can be expressed as the sum of two independent functions for an entire shell. A more general relation is also discussed which is true for any shell in which the generalized seniority scheme is valid.

48960 **Excitation of the isovector giant dipole by α-particle scattering.** Shlomo, S.; Youngblood, D.H.; Udagawa, T.; Tamura, T. (Cyclotron Institute, Texas A&M University, College Station, Texas 77840). *Physical Review Letters;* **59**: No. 9, 1054-1054(31 Aug 1987).

A Comment on the Letter by R. J. Peterson, Phys. Rev. Lett. 57, 1550 (1986).

48961 **Anomalous two-neutron transfer cross sections at large separation in heavy ion reactions.** Juutinen, S.; Liu, X.T.; Soerensen, S.; Cox, B.; Kincaid, R.W.; Bingham, C.R.; Guidry, M.W.; Kernan, W.J.; Wu, C.Y.; Vogt, E. (Tennessee Univ., Knoxville, USA. Dept. of Physics; Oak Ridge National Lab., TN, USA). *Physics Letters [Section] B;* **192**: No. 3/4, 307-311(2 Jul 1987). Contract AC05-84OR21400;AS05-76ER04936.

It is shown that the average radial slope of two-particle transfer form factors for very heavy ion collisions is considerably smaller than expected. It is also demonstrated that this effect is not due to intrinsic excitation of reaction fragments, and that the average behavior masks a critical dependence of the slope on the angular momentum of the states excited in the transfer reaction.

48962 **Octupole shapes and shape changes at high spins in Ra and Th nuclei.** Nazarewicz, W.; Leander, G.A.; Dudek, J. (Joint Inst. for Heavy-Ion Research, Oak Ridge, TN, USA; UNISOR, Oak Ridge, TN, USA; Oak Ridge Associated Universities, Inc., TN, USA; Strasbourg-1 Univ., 67, France. Centre de Recherches Nucleaires). *Nuclear Physics [Section] A;* **467**: No. 3, 437-460(8 Jun 1987). Contract AS05-76ER04936;AC05-84OR21400;AC05-76OR00033.

The shapes of rotating Ra and Th nuclei ($130 \leqq N \leqq 138$) are calculated using the cranking model. The lightest isotopes have spherical ground states, but develop octupole and quadrupole deformations under rotation which remain up to very high spins. The ground states of the heavier isotopes have octupole and quadrupole deformations which persist up to intermediately high spins (I = 14-24 Planck constant). At higher spins, a transition is predicted to take place along the yrast line to shapes with similar quadrupole but no octupole deformation component.

48963 Nucleon-nucleon force from a chiral Lagrangian with omega-stabilization. Erell, A.; Eisenberg, J.M.; Silbar, R.R. (Raymond and Beverly Sackler Faculty of Exact Sciences, Tel Aviv University, 69978 Tel Aviv, Israel). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 70-71(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

Several authors have previously found that the usual Skyrme model, when applied to the nucleon-nucleon force problem, does not supply intermediate-range attraction. This serious deficiency is here overcome using a chiral-soliton model in which stabilization is provided by an omega meson in interaction with the soliton rather than by a term in the fourth power of the soliton derivative.

48964 Microscopic approaches to NN-bar annihilation potentials. Myhrer, F. (University of South Carolina, Columbia, SC 29208). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 96-107(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

The chiral quark models have given us a reasonable description of nucleons as a quark core surrounded by a meson cloud. When we scatter two nucleons we expect the large impact parameers to be dominated by meson exchanges. For nucleon-antinucleon scattering the same description is expected. However, for small impact parameters when the quark cores overlap, we expect annihilation to dominate. Therefore a study of the annihilation processes should give us information about the quark core in a nucleon. An attempt to calculate an NN-bar annihilation optical potential using chiral quark model properties will be discussed and we will show that the proton r.m.s. radius constrains the effective annihilation potential for NN-bar scattering.

48965 Experiments on eta-meson production. Peng, J.C. (Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 255-270(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

Following a review of some highlights of eta-meson characteristics, the status of eta-meson production experiments is reviewed. The physics motivations and first results of two LAMPF experiments on (π, eta) reactions are discussed. Possible future experiments are also discussed.

48966 ^{5}He: hadrons or quarks. Gibson, B.F. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 390-391(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

An understanding of the lambda-He-5 hypernucleus in terms of standard nuclear models, i.e., mesons and nucleons, has been very successful. However, a description of this hypernucleus in terms of quarks and gluons is not yet complete.

48967 K^+ as a probe of partial deconfinement in nuclei. Siegel, P.B.; Gibbs, W.R.; Kaufmann, W.B. (Arizona State University and Los Alamos National Laboratory). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 396-397(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

S-wave phase shifts and positive-kaon scattering are discussed in term of a possible means in which to study the EMC effect.

48968 Model dependence of $pp \rightarrow np\pi^+$ spin observables. Silbar, R.R.; Tjon, J.A.; van Faassen, E.E.; Dubach, J.; Kloet, W.M. (Los Alamos National Laboratory, Los Alamos, NM 87545). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 398-399(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

Two unitary models are used to calculate the spin observables in nuclei nucleon reactions.

48969 Nuclear wave functions for three particle states. Singham, M.K. (Los Alamos National Laboratory (MP-DO/T-5) Los Alamos, NM 87575). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 400-401(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

Calculation of reduced density matrix elements for the transition between two nuclear states is discussed. Calculation of the reduced matrix elements by way of standard shell model methods is compared with a parameterized fitting procedure which begins with the nuclear wave functions in order to overcome any inherent inconsistencies.

48970 Relativistic impulse approximation for nuclear inelastic scattering. Shepard, J.R. (University of Colorado, Boulder, CO 80309). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 48-68(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

The Relativistic Impulse Approximation (RIA) for proton-nucleus elastic and inelastic scattering is contrasted with its non-relativistic counterpart (the NRIA). Differences between the two approaches are examined with special emphasis on the nuclear convection current and its generalizations which may show signatures of strong relativistic nuclear potentials. A simple extension of the RIA to meson-nucleus scattering based on the linear, spin-zero Duffin-Kemmer wave equation is considered.

48971 Energy dependence of the relativistic effects in the Dirac-equation-based models of scattering of nucleons from nuclei. Bleszynski, E.; Bleszynski, M.; Jaroszewicz, J. (Physics Department, UCLA, Los Angeles, California 90024). *AIP (American Institute of Physics) Conference Proceedings;* **133**: No. 1, 378-379(15 Sep 1985). (CONF-8503120—).

From Hadronic probes and nuclear interactions conference; Tempe, AZ, USA (11 Mar 1985).

An attempt to identify the aspects of the relativistic scattering theory which are responsible for the successful description of nucleon-nuclei scattering data is presented. Nucleon interactions in nuclei, a dependence on the energy of the incident particle, and Glauber theory are represented in this discussion.

6540 Radiation And Shielding Physics

REFER ALSO TO CITATION(S) 47939

48972 (AD-A—182601/5/XAB) Neutral-beam-propagation effects in the upper atmosphere. 2. Technical report. Li, T.; Kalman, G.; Pulsifer, P. (Boston Coll., Chestnut Hill, MA (USA). Dept. of Physics). 1 Mar 1986. 100p. (SCIENTIFIC—2). NTIS, PC A05/MF A01.

See also AD-A174 896.

Electron (proton) trajectory equations are obtained for various electric-field and magentic-field configurations. These trajectory equations provide the basis for calculating self-stripping, which was proposed as an important beam-attenuation process. The average relative electron-beam energy is calculated to determine the beam energy and configuration dependence of the stripping process. Results for beam attenuation due to electron beam stripping are obtained for the zero-field model and space charge field model. Proton beam stripping was shown to be negligible. Attenuation versus distance graphs are presented for various magnetic field angles and relevant beam parameters such as beam energy, beam intensity, and beam radius.

48973 (CONF-871004—1) US-Japan Cooperative Program on neutron scattering. Wilkinson, M.K.; Blume, M.; Stevens, D.K.; Iizumi, M.; Yamada, Y. (Oak Ridge National Lab., TN (USA); Brookhaven National Lab., Upton, NY (USA); USDOE, Washington, DC; Japan Atomic Energy Research Inst., Tokai, Ibaraki; Tokyo Univ. (Japan). Inst. for Solid State Physics). 1987. Contract AC05-84OR21400. 13p. (IAEA-SM—300/050). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014563.

From International conference on the utilization of multipurpose research reactors and related international co-operation; Grenoble, France (19 Oct 1987).

The US-Japan Cooperative Program on Neutron Scattering was implemented through arrangements by the United States Department of Energy with the Science and Technology Agency (STA) and the Ministry of Science, Education, and Culture (Monbusho) of Japan. It involves research collaboration in neutron scattering by Japanese scientists with scientists at Oak Ridge National Laboratory (ORNL) and Brookhaven National Laboratory (BNL) and the construction of new neutron scattering equipment at both laboratories with funds provided by the Japanese government. The United States provides neutrons in exchange for the new equipment, and other costs of the program are equally shared by the two countries. The assignments of Japanese scientists to ORNL and BNL vary in length, but they correspond to about two person years annually at each laboratory. An equal number of US scientists also participate in the research program. The main research collaboration is centered around the new equipment provided by the Japanese, but other facilities are utilized when they are needed. The new equipment includes a new type of wide-angle diffractometer and equipment for maintaining extreme sample environments at ORNL and a sophisticated polarized-beam triple-axis spectrometer at BNL. 13 refs., 3 figs.

48974 (CONF-871101—24) Neutron slowing down and transport in an infinite medium: 1, Generalized age-theory and its range of validity. Cacuci, D.G. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 7p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87011664.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

This paper presents a new analytical expression for the scalar flux in an infinite homogeneous medium. This expression is called Generalized Age-Theory. The expression for R(A) - the (mass dependent) range of validity of this Generalized Age-Theory - has also been determined.

48975 (CONF-871101—25) Neutron slowing down and transport in an infinite medium: 2, The scalar flux at large distances/small lethargies. Cacuci, D.G. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 5p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87011665.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

A companion paper has presented a Generalized Age-Theory expression for the scalar flux PSI$_0$/sup G/(x,u) due to a plane isotropic source emitting neutrons in an infinite medium with cross sections that are constant in energy. The range of validity for this Generalized Age-Theory expression has also been determined as $p = x/(2u) \leq R(A)$, where R(A), the range of validity, is a function of the scatterer's mass. The purpose of this paper is to present the expression for the scalar flux Psi$_0$/sup G/(x,u) in the complementary region in phase-space, i.e., where $p > R(A)$.

48976 (CONF-871101—33) ANSL-V: ENDF/B-V based multigroup cross-section libraries for Advanced Neutron Source (ANS) reactor studies. Ford, W.E. III; Arwood, J.W.; Greene, N.M.; Petrie, L.M.; Primm, R.T. III; Waddell, M.W.; Webster, C.C.; Westfall, R.M.; Wright, R.Q. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 11p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87011675.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

Multigroup P3 neutron, P0-P3 secondary gamma ray production (SGRP), and P6 gamma ray interaction (GRI) cross section libraries have been generated to support design work on the Advanced Neutron Source (ANS) reactor. The libraries, designated ANSL-V (Advanced Neutron Source Cross-Section Libraries), are data bases in a format suitable for subsequent generation of problem dependent cross sections. The ANSL-V libraries are available on magnetic tape from the Radiation Shielding Information Center at Oak Ridge National Laboratory.

48977 (IFVE-ORI—85-8) Simulating neutron, photon and charged particle trajectories in geometric-computer systems. Maslov, M.A.; Mokhov, N.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703247.

The interative-step method is proposed to construct three-dimensional hadron, electron and photon trajectories. Algorithms of simulating multiple Coulomb scattering of charged particles and external magnetic field action are given. The geometrical module RAY-REGION for solution of the three-dimensional problem of hadron and muon transport in an arbitrary three-dimensional geometry is described. 11 refs.

48978 Range-energy relation for Au ions, E/A≦150 MeV. Heckman, H.H.; Bowman, H.R.; Karant, Y.J.; Rasmussen, J.O.; Warwick, A.I.; Xu, Z.Z. (Nuclear Science Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3654-3668(15 Oct 1987). Contract AC03-76SF00098.

The range-energy (RE) relations for Au ions in CH and Au in the energy interval $10 \leq E/A \leq 150$ MeV are reported. Bevalac beams of Au/sup 61+/, Au/sup 35+/, and Au/sup 11+/ at E/A = 50 MeV were used to investigate the dependence of dE/dx, hence effective charge z/sup */, of Au ions in matter as a function of target material and initial charge of incident Au ions. The essential finding of this experiment is that the measured ranges of the Au ions are typically within 2% of those predicted by the Barkas-Berger RE relation. The experimental RE relations for Au in CH and Au can also be reproduced with equal precision by assuming that dE/dx is given by the product of the rate of energy loss for protons and an empirically derived expression for z/sup */^{2}, each quantity being dependent on the target material, via the adjusted ionization potential I/sub adj/ and the velocity β of the ion.

48979 Diffusion in a periodic Lorentz gas. Moran, B.; Hoover, W.G.; Bestiale, S. (Lawrence Livermore National Laboratory, and Department of Applied Science, University of California at Davis-Livermore, Livermore, California 94550). *Journal of Statistical Physics;* **48**: No. 2, 709-726(Aug 1987). Contract W-7405-ENG-48.

We use a constant "driving force" F/sub d/ together with a Gaussian thermostatting "constraint force" F/sub c/ to simulate a nonequilibrium steady-state current (particle velocity) in periodic, two-dimensional, classical Lorentz gas. The ratio of the average particle velocity to the driving force (field strength) is the Lorentz-gas conductivity. A regular "Galton-board" lattice of fixed particles is arranged in a dense triangular-lattice structure. The moving scatterer particle travels through the lattice at constant kinetic energy, making elastic hard-disk collisions with the fixed particles. At low field strengths the nonequilibrium conductivity is statistically indistinguishable from the equilibrium Green—Kubo estimate of Machta and Zwanzig. The low-field conductivity varies smoothly, but in a complicated way, with field strength. For moderate fields the conductivity generally decreases nearly linearly with field, but is nearly discontinuous at certain values where interesting stable cycles of collisions occur. As the field is increased, the phase-space probability density drops in apparent fractal dimensionality from 3 to 1. We compare the nonlinear conductivity with similar zero-density results from the two-particle Boltzmann equation. We also tabulate the variation of the kinetic pressure as a function of the field strength.

6550 Medical Physics

REFER ALSO TO CITATION(S) 48470

48980 (IFVE-ORI—85-5) Specific kerma equivalent for photons and neutrons up to 20 MeV. Alekseev, A.G.; Golovchik, V.T.; Savinskij, A.K. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1985. 20p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703246.

Specific kerma equivalent, specific Kerma and quality factor have been calculated for photons and neutrons in the photon energy range from 0.1 KeV to 20 MeV and the neutron energy range from thermal neutron energies up to 20 MeV. The latest recomendation of the tissue composition, the LET data for charged particles and more recent cross-sections data for photon and neutron reactions induced in tissue have been used. This information can be used to estimate the radiation dose equivalent and for the interpretation of the tissue-equivalent equidosemeter energy responses. 20 refs.; 7 figs.; 1 tab.

48981 (INIS-mf—10956, pp 47) **Calibration of neutron monitors for the purpose of radiation protection at the CSIR.** Weidema, O. (Council for Scientific and Industrial Research, Pretoria, South Africa. National Physical Research Lab.). 1985. (In Afrikaans). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48982 (INIS-mf—10956, pp 36) **Optimal source position times in intracavitary radiotherapy.** Pistorius, S.; Groenewald, W.A. (Tygerberg Hospital, Bellville, South Africa. Dept. of Medical Physics). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48983 (INIS-mf—10956, pp 38) **Radiation doses received by personnel during radiopharmaceutical preparation.** Gagiano, J.; Rabe, W.L.; Willemse, C.A.; Labuschagne, J.; Loetter, M.G.; Minnaar, P.C. (University of the Orange Free State, Bloemfontein, South Africa). 1985. (In Afrikaans). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48984 (INIS-mf—10956, pp 34) **Absorbed dose calorimetry.** Almond, P.R. (Anderson, M.D. Hospital and Tumor Inst., Houston, TX, USA). 1985. NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48985 (INIS-mf—10956, pp 34) **Quality of the Pretoria fast neutron beam.** Slabbert, J.P. (Council for Scientific and Industrial Research, Pretoria, South Africa. National Accelerator Centre). 1985. (In Afrikaans). NTIS (US Sales Only), PC A03/MF A01. File Number DE87703269. (CONF-8503143—).

From 25. anniversary congress of the South African Association of Physicists in medicine and biology; Capetown, South Africa (18 Mar 1985).

48986 (SIS—1986:2) Radiological diagnostic examinations in Norway - 1983. Saxeboel, G. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1986. 9p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752517.

In 1983 the frequency of medical X-ray examinations in Norway has been reported to 641.3 examinations per 1000 inhabitants. Geographical variations are presented as well as the relative frequency of approximately 70 different examinations.

48987 (SIS—1987:2) Radiation hygiene analysis of medical activities in Norway. Development of an analytical tool. Lundgren, L.; Olerud, H.; Saxeboel, G. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1987. 67p. (In Norwegian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752518.

A status report from the project Radiation hygiene analysis of medical activities in Norway is presented. A principal project description as well as the main purpose of the project are presented. The report gives information on methods and strategy in connection with patient dose measurements and instrument calibration. The main task of the report is to present and explain the development of an analytical tool based on computer programs. At present, five different programs are produced, linked together in a menusystem. The programs deal with registration of observed variables, compute aritmetic mean/median values, make statistics,and plot and calculate integrated doses from X-ray examinations of interest. So far approximately 2200 X-ray examinations have been observed, each limited to 24 observation variables. The potential power of the analytical tool is demonstrated for the barium meal examination. The analysis indicates a mean integrated energy of 229 mJ per examination, while the annual collective dose from these examinations is 200 manSv in Norway. Discussion of facts relevant to optimization clearly shows that the use of 100 mm technique should be encouraged. 18 refs.

48988 (ZfK—590, pp 3-4) **New limits and conditions for the safe operation of the AMOR-1 facility for the fission molybdenum production in Rossendorf.** Eckardt, A.; Runge, K.; Gegusch, M. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic; Staatliches Amt fuer Atomsicherheit und Strahlenschutz, Berlin, German Democratic Republic). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48989 (ZfK—590, pp 16-17) **Determination of the temperature and absorbed dose rates at a model body with radiation sources of high activity.** Schneider, L.; Weber, W.; Kaiser, F.; Jung, V. (KKW 'Bruno Leuschner' Forschungsbereich Dresden, German Democratic Republic; Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden, German Democratic Republic). Jun 1986. (In German). NTIS (US Sales Only), PC A06/MF A01. File Number DE87703048.

In Annual Report 1985. Radioisotope Department.

48990 Incorporation of Monte Carlo electron interface studies into photon general cavity theory. Horowitz, Y.S.; Moscovitch, M.; Mack, J.M.; Hsu, H.; Kearsley, E. (Ben-Gurion Univ. of the Negev, Beersheba, Israel; Los Alamos National Lab., NM; Dept. of the Navy, Bethseda, MD). *Radiation Protection Dosimetry;* **17**: No. 1-4, 437-441(1986). (CONF-860806—).

From 8. international conference on solid state dosimetry; Oxford, UK (26 Aug 1986).

Electron Monte Carlo calculations using CYLTRAN and a new PHSECE (photon produced secondary electrons) technique were carried out to estimate electron fluences and energy deposition profiles near LiF/Al and LiF/Pb material interfaces undergoing ^{60}Co irradiation. Several interesting and new features emerge: (i) Although the build-up of the secondary electron fluences at the interfaces of the irradiated media is approximately exponential, the value of the electron mass fluence build-up coefficient, γ, is not equal to the electron mass fluence attenuation coefficient, β. (ii) the β value of the attenuation of the gamma generated electron

fluences at the cavity-medium interfaces is strongly dependent on the Z of the adjacent material. (iii) For LiF/Pb there is a significant intrusion energy deposition mode arising from side-scattering in the wall (Pb) material. These new features of interface dosimetry (at least (i) and (ii)) are incorporated into photon general cavity theory and compared with experimental data.

6560 Condensed Matter Physics

REFER ALSO TO CITATION(S) 47804, 47805, 47807, 47824, 47842, 47924, 47999, 48142, 48199, 48900, 49017, 49055

48991 **(DOE/ER/45065—1) [Nuclear magnetic resonance studies of ion motion in solid electrolytes]: Final report.** Bjorkstam, J.L. (Washington Univ., Seattle (USA). Dept. of Electrical Engineering). 26 Aug 1987. Contract FG06-84ER45065. 3p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014547.

This report presents a brief review of work carried out in connection with superionic conductors, especially sodium-beta-alumina. The spin-lattice relaxation time was measured. (JDH)

48992 **(DOE/ER/45234—T2) The structure and reactivity of heterogeneous surfaces and study of the geometry of surface complexes: Progress summary, January 1, 1987-December 31, 1987.** Landman, U. (Georgia Inst. of Tech., Atlanta (USA). School of Physics). 1987. Contract FG05-86ER45234. 15p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000158.

Our research activities during 1987 were directed toward the formulation and implementation of new theoretical methods and computational algorithms and their application in studies of materials phenomena of fundamental and technological interests. These research efforts resulted in several papers which were submitted and accepted by scientific journals and conference presentations. In the following we highlight certain of our research activities, include some of the written reports, and a list of publications, to date. Included topics are: The Mechanism, Kinetics and Dynamics of Silicon Crystal Growth, Simulations of Amorphous Silicon, Dynamics of Tip Substrate Interactions in Atomic Force Microscopy, Dynamics and Excitations in Coupled Quantum-Classical Systems, and The Physics of Small Clusters.

48993 **(DOE/ER/60415—3) Vacuum ultraviolet electronic properties of liquids: Annual progress report, February 1, 1987-January 31, 1988.** Painter, L.R. (Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy). Sep 1987. Contract FG05-86ER60415. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000165.

This paper contains a progress report on experiments done on the electronic properties of liquids in the far ultraviolet region. Topics discussed in this report are: a new scanning-tunneling microscope, photoemission phenomenon from liquids, ionic doping, and surface charging in liquids. (LSP)

48994 (INIS-SU—417, pp 3-5) **Disproportional phase in barium-sodium niobate crystals.** Ivanova, S.V.; Naumova, I.I.; Leont'eva, I.N. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).

In Quantum radiophysics. Collection.

Rayleigh scattering and differential thermal analysis (DTA) are used to study disproportional phase transformations in different by composition and orientation Ba/sub 2/NaNb/sub 5/O/sub 15/ crystals at growing. At 240-260 deg C first-kind transformation is observed, at 300 deg C - second-kind phase transformation. Second-kind transformation is detected at 200 deg C. Use of DTA and Rayleigh scattering methods permits to determine phase transformation order and to study composition, impurities and growing orientation effect on phase transformation parameters (temperature, transformation "smearing" degree, thermal effect value). 7 refs.; 3 figs.

48995 (INIS-SU—419, pp 27-29) **Photoconductivity spectrum of p-type intrinsic-defective zinc selenide.** Georgobiani, A.N.; Kotlyarevskij, M.B.; Pegov, A.A.; Urusov, B.G. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780005.

Kratkie Soobshcheniya po Fizike.; (no.8).

In Experimental and theoretical physics. Collection.

In photoconductivity spectra of ZnSe monocrystalline layers of p-type the peaks caused by isolated point defects are identified and the peak related to low acceptor E/sub ν/+0.12 eV is found. 7 refs.; 3 figs.

48996 **(INIS-SU—419) Experimental and theoretical physics. Collection.** (AN SSSR, Moscow. Fizicheskij Inst.). 1986. 53p. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780005.

Kratkie Soobshcheniya po Fizike.; (no.8).

Individual papers have been cataloged separately. (WRF)

48997 **(LA-UR—87-2618) New theory for competing interactions and microstructures in partially-ordered (liquid-crystalline) phases.** Dowell, F. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 8p. (CONF-8705168—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014739.

From Workshop on competing interactions and microstructures: statics and dynamics; Los Alamos, NM, USA (5 May 1987).

A summary of results from a unique statistical-physics theory to predict and explain competing interactions and resulting microstructures in some partially-ordered [in this case, liquid-crystalline (LC)] phases is presented. The static aspects of both partial orientational and partial positional ordering of the molecules into various microstructures in these phases (including the incommensurate smectic-Ad phase) can be understood in terms of various competing interactions (both entropic and energetic) involved in the packing together of the different molecular sub-units at given pressures and temperatures. These microstructures are predicted and explained (using no ad hoc or arbitrarily adjustable parameter) as a function of molecule chemical structure [including lengths and shapes (from bond lengths and angles), intramolecular rotations, site-site polarizabilities and pair potentials, dipole moments, etc]. Theoretical results are presented for the nematic, re-entrant nematic, smectic-Ad, and smectic-Al LC phases and the isotropic phase.

48998 **(LA-UR—87-2722) Applications of a theory of ferromagnetic hysteresis.** Hodgdon, M.L. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 25p. (CONF-870806—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014725.

From 6. conference on the computation of electromagnetic fields; Graz, Austria (25 Aug 1987).

The differential equation $dB/dt = \alpha$ absolute value of dH/dt [f(H) - B] + dH/dt g(H) and a set of restrictions on the material functions f and g yield a theory of rate independent hysteresis for isoperm ferromagnetic materials. A modification based on exchanging the positions of B and H in the differential equation and on allowing for the dependence of the material functions on dH/dt extends the theory to rate dependent, nonisoperm materials. The theory and its extension exhibit all of the important features of ferromagnetic hysteresis, including the existence and stability of minor loops. Both are well suited for use in numerical field solving codes. Examples in which the material functions are simple combinations of analytic functions are presented here for Mn-Zn ferrite, Permalloy, CMD5005, and CoCr thin film. Also presented is a procedure for constructing a two dimensional vector model that yields bell-shaped and M-shaped curves for graphs of the angular variation of the coercive field.

48999 **(LA-UR—87-2921) Birch's law and the properties of high temperature fluid metals.** Shaner, J.W. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 7p. (CONF-8708131—1). NTIS, PC A02/MF A01; GPO Dep. File Number DE87014744.

From EHPRG conference; Potsdam, German D.R. (25 Aug 1987).

By comparing acoustic velocities in fluid metals over a very wide range of densities we have established Birch's Law as an approximate representation over the entire liquid range. For a given liquid metal the acoustic velocity is close to linear in density, with a slope determined by the atomic weight. The measurements include isobaric expansion to less than half normal density, ultrasonics on molten metals at 1 atmosphere, and shock-melted metals to greater than twice normal density. We also find unusual behavior of the Gruneisen gamma, which can be explained in terms of simple fluid models. 15 refs.

49000 **(UCRL—97264) Electron capture from solids by positrons.** Howell, R. (Lawrence Livermore National Lab., CA (USA)). Aug 1987. Contract W-7405-ENG-48. 9p. (CONF-870731—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014355.

From 4. international workshop on positrons in gases; London, UK (16 Jul 1987).

The capture of electrons in solids is modified from that in gasses by several factors. The most important is the collective interaction of the electrons which results in a density of electron states in the solid in wide bands. Also the high density of electrons in many solids gives a high frequency of interaction as compared to gasses, and quickly destroys any electron-positron states in the metal matrix. Consequently, most positrons implanted in a metal will rapidly thermalize, and unless they reach the surface will annihilate with an electron in an uncorrelated state. Positronium formation from positrons scattered at a metal surface is analogous to ion neutralization however, most of the positronium comes from positrons passing through the surface from the bulk. The dominant motivation for studying positronium formation has been the hope that the distribution of the electrons at the surface would be obtained through the annihilation properties of positrons trapped at the surface or through analysis of the energy and angular distributions of the positronium emitted into the vacuum. These distributions have been measured and are included in this paper. 17 refs.

49001 **Relativistic screened orbital radii.** Zhang, S.B.; Cohen, M.L.; Phillips, J.C. (Department of Physics, University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 11, 5861-5867(15 Oct 1987).

We have computed first-principles atomic nodal radii and Zunger-Cohen radii including relativistic corrections. It is shown that typical relativistic corrections are about 10% for the s orbitals and about 5% for the p orbitals for the Au row. These are important for the construction of structure maps with intermetallic compounds. Other applications of orbital radii are proposed and discussed.

49002 **Dynamics of dense lattices.** Rosenau, P. (Department of Mechanical Engineering, Technion-Israel Institute of Technology, Haifa, 32000, Israel). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 11, 5868-5876(15 Oct 1987).

We derive the equations governing the nonlinear dynamics of one-, two-, and three-dimensional lattices in a close to continuum condition (i.e., a dense lattice). The described method correctly captures all terms to a given order in discreteness and, unlike previous approaches, leads to well-behaved partial-differential equations for these problems. In general, the dispersion born out of discreteness counteracts the steepening of waves caused by the nonlinearity and leads to the formation of permanent nonlinear structures.

49003 **Hypervelocity-impact phenomena via molecular dynamics.** Holian, B.L. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *A: General Physics;* **36**: No. 8, 3943-3946(15 Oct 1987).

Novel molecular-dynamics calculations have been carried out for a hypervelocity impact of a sphere of 683 atoms (a central atom surrounded by 23 coordination shells) hitting a rectangular plate composed of 8000 atoms (five close-packed planes thick). The ratio of the sphere diameter to the plate thickness was chosen to be approximately 2.4, with the velocity of the sphere chosen such that its kinetic energy was roughly 25 times its binding energy, relative to the bottom of the potential well. Under these conditions, the debris cloud generated by the ball after it penetrates the wall is composed mostly of vaporized material. These microscopic results scale hydrodynamically to macroscopic experiments of a lead sphere hitting a lead plate at u/sub p/ = 6.6 km/s. There are striking similarities between these atomistic calculations and continuum hydrodynamics simulations, as well as notable differences.

49004 **Observation of elastic scattering of positrons and electrons at glancing incidence.** Mayer, R.; Zhang, C.S.; Lynn, K.G.; Throwe, J.; Marcus, P.M.; Gidley, D.W.; Jona, F. (Department of Physics, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review* [*Section*] *B: Condensed Matter;* **36**: No. 10, 5659-5662(1 Oct 1987).

Elastic intensity versus energy (I-V) spectra have been observed using both positrons and electrons scattered at glancing incidence (83°—56° with respect to the surface normal) in the energy range of 50—450 eV from a variety of metallic and alkali-metal-halide surfaces. Unlike the electron spectra under the same conditions, all glancing-angle positron I-V spectra have broad (≧100 eV) features. The enhanced broadening is associated with the reduced penetration depth of the elastically scattered positrons. Peak positions and widths fit a quasikinematic calculation of the intensity for Cu(100).

49005 **IPNS Rietveld analysis software package for time-of-flight powder diffraction data: recent developments.** Rotella, F.J.; Richardson, J.W. (Argonne National Lab., IL; Univ. of Chicago, IL). pp 27-36 of Workshop on neutron scattering data analysis 1986. Proceedings of a meeting held at the Rutherford Appleton Laboratory, Chilton, 13-14 March, 1986. Johnson, M.W. Bristol, England; Institute of Physics Publishing Ltd. (1986). (CONF-8603150—).

From Workshop on neutron scattering data analysis; Oxford, UK (13 Mar 1986).

The paper concerns recent developments in the system of computer programs used at the Intense Pulsed Neutron Source, Argonne National Laboratory, U.S.A., for the analysis of time-of-flight neutron diffraction data via the Rietveld method. These developments include: multiple phase Rietveld analysis, anisotropic strain broadening of diffraction peaks, anharmonic thermal vibrations, and removal of non-crystalline scattering via fourier-filtering.

49006 **Analysis of inelastic neutron scattering spectra from a time-of-flight spectrometer with filter detector.** Vorderwisch, P.; Mezei, F.; Eckert, J.; Goldstone, J.A. (Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H., Germany, F.R.; Los Alamos National Lab., NM). pp 161-168 of Workshop on neutron scattering data analysis 1986. Proceedings of a meeting held at the Rutherford Appleton Laboratory, Chilton, 13-14 March, 1986. Johnson, M.W. Bristol, England; Institute of Physics Publishing Ltd. (1986). (CONF-8603150—).

From Workshop on neutron scattering data analysis; Oxford, UK (13 Mar 1986).

Inelastic neutron scattering spectra obtained from time-of-flight spectrometers with filter detector, suffer in energy resolution from a long time-of-flight tail in the filter response function. A mathematical method is described which removes this tail in measured spectra. The energy resolution can thereby be adapted for each part of the spectrum. Applications of the method to data taken at the Neutron Scattering Centre Los Alamos pulsed spallation source are presented.

6561 Superconductivity

REFER ALSO TO CITATION(S) 47855, 47859, 47862, 47867, 47869, 47870, 47871, 48108

49007 **(BNL—40196) Magnetic correlations and heavy fermion systems.** Goldman, A.I. (Brookhaven National Lab., Upton, NY (USA)). 1987. Contract AC02-76CH00016. 6p. (CONF-870873—12). NTIS, PC A02. File Number DE87014398.

From 18. conference on low temperature physics; Kyoto, Japan (20 Aug 1987).

Polarized and unpolarized neutron scattering measurements on both the Ce and U based heavy fermion systems have provided a great deal of evidence for the formation of a coherent state involving the f-electrons at low temperature. These experiments are reviewed, and common features of the low temperature magnetic correlations are discussed. 42 refs., 1 fig.

49008 **(CONF-8709124—1-Draft) The itinerant resonating-valence-bond model for superconductivity.** Liu, S.H. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 27p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014794.

From Symposium on low temperature physics; Hsin-chu, Taiwan (7 Sep 1987).

It has been proposed by Anderson that the pairing interaction in high temperature superconductors La/sub 2-x/ Sr/sub x/ CuO_4 and Yba_2Cu_3O/sub 7-x/ is magnetic in origin, and the recent discovery of antiferromagnetic ordering in La_2CuO_4 has been regarded as strong evidence in support of this so-called resonating-valence-bond (RVB) model. Close examination of the ordered state of this material reveals that it is an itinerant antiferromagnet. Accordingly, the superconducting properties must also be studied using the itinerant model approach, rather than the local moment model discussed so far in literature. This paper reports an approximate solution of the itinerant RVB model of superconductivity. It is shown that superconductivity can take place in a narrow region of the parameter space, and that the fluctuating local exchange field causes the superconducting state to be gapless. 19 refs.

49009 **(DOE/ER/45268—1) Studies of heavy fermion systems: Progress report, July 1, 1986-December 31, 1987.** Stewart, G.R. (Florida Univ., Gainesville (USA). Dept. of Physics). Aug 1987. Contract FG05-86ER45268. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014902.

Studies of the resistivity, susceptibility, and specific heat of the new heavy fermion system UPt/sub 5-x/Au/sub x/ have shown: (1) the high effective mass, m*, can be varied by almost an order of magnitude by varying x near x = 1; and (2) the occurrence of high m* in this system and (presumably) in heavy fermion systems in general is typified by a nearness to magnetic instability. High field (24 T) specific heat studies of $CeCu_6$ show a total suppression of the low temperature heavy fermion ground state by magnetic field, in direct contradiction of present non-interacting "Kondo lattice" theory.

6570 Theoretical And Mathematical Physics

REFER ALSO TO CITATION(S) 47858, 47896, 47949, 47950, 47951, 47952, 47953, 47954, 47955, 47956, 47957, 47958, 47959, 47960, 47961, 47962, 47963, 47964, 47965, 47966, 47967, 47968, 47969, 47971, 47972, 47973, 47974, 47975, 47976, 47977, 47978, 47979, 47980, 47981, 47982, 47983, 47984, 47993, 48025, 48700, 48715, 48716, 49181

49010 **(DOE/ER/13147—3) Perturbation and characterization of nonlinear processes: Progress report, November 15, 1983-June 1, 1987.** Swinney, H.L.; Swift, J. (Texas Univ., Austin (USA)). 1987. Contract AS05-84ER13147. 8p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014580.

This progress report summarizes the principal accomplishments dealing with perturbation and characterization of nonlinear processes. Topics of research include Lyapunov equations, mutual information and metric entropy, the dimensions, complex dynamics and transition sequences and spatial patterns. (LSP)

49011 **(DOE/ER/40200—108) Families of Bose rays in quantum optics.** Mukunda, N.; Sudarshan, E.C.G.; Simon, R. (Texas Univ., Austin (USA). Center for Particle Theory; Indian Inst. of Science, Bangalore; Institute of Mathematical Sciences, Madras (India)). Jul 1987. Contract FG05-85ER40200. 23p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014584.

Having known classical wave optics and wave mechanics, is it possible to reverse Schroedinger's path and extend the concept of families of rays of light to provide a new exact rendering of quantum optics including the Bose nature of photons? This question is answered in the affirmative, and the implications of the Bose symmetry for certain nonlocal correlations of the many ray distribution functions are worked out. The similarities and the differences between classical and quantum wave optics are brought out. The ray-ray Bose correlation is analyzed. The generating functional for the many ray distribution functions is formulated; and the notion of paraxial illumination for quantum optics is made precise.

49012 (DOE/ER/60420—1, pp 21-32) **Systematic construction of upper and lower bounds to the ground state energy of the Schroedinger equation.** Bessis, D.; Handy, C.R. (Georgia Institute of Technology, Atlanta). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

For the multidimensional Schroedinger equation, they develop a technique based on the moment problem formulation of this equation. The method provides systematic and rapidly converging upper and lower bounds to the ground state energy, and it enjoys the following features: (1) The bounds are insensitive to the strength of the perturbation; that is, the method applies even to the most singular perturbation. (2) The method does not require the potential to be semibounded. It applies directly to potentials whose spectrum extends from minus to plus infinity, as is the case for the Zeeman effect in hydrogenic atoms. (3) The presence of continuum spectrum does not affect the method: no information coming from the continuum is needed. 1 figure.

49013 (DOE/ER/60420—1, pp 33-43) **Numerical solution of the Schroedinger equation with a polynomial potential.** Campoy, G.; Palma, A. (Universidad de Sonora, Hermosillo, Mexico). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A numerical method for solving the Schroedinger equation for a potential expressed as a polynomial is proposed. The basic assumption relies on the asymptotic properties of the solution of this equation. It is possible to obtain the energies and the stationary state functions simultaneously. They analyze, in particular, the cases of the quartic anharmonic oscillator and a hydrogen atom perturbed by a quadratic term, obtaining its energy eigenvalues for some values of the perturbation parameter. Together with the Hellmann-Feynman theorem, they use their algorithm to calculate expectation values of x^n for arbitrary positive values of n. 4 tables.

49014 (DOE/ER/60420—1, pp 65-72) **Lower bounds to ground state eigenvalues of the Schroedinger equation via optimized inner projection: application to quartic and sextic anharmonic oscillators.** Cizek, J.; Vrscay, E.R. (Univ. of Waterloo, Ontario). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Inner projection combined with bracketing techniques represents a very powerful method of calculating lower bounds to eigenvalues of the Schroedinger equation. The Hamiltonian is expressed as a sum of an unperturbed operator (whose eigenvalue equation is soluble) and a perturbed operator that should be positive definite. For small values of the coupling constant, the conventional splitting of the Hamiltonian is adequate. For strong coupling, however, it is advantageous to partition the Hamiltonian in an optimized fashion, accomplished by an appropriate scaling of the space coordinates and momenta. This optimized inner projection (OIP) method yields remarkably good results for all values of the coupling constant, even for manifolds of minimal dimensionality.

49015 (DOE/ER/60420—1, pp 73-80) **R matrix: its relation to Titchmarsh-Weyl theory and its complex rotated analogue.** Elander, N.; Krylstedt, P.; Braendas, E.; Engdahl, E. (Research Institute of Physics, Stockholm, Sweden). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The R matrix theory in its simplest form is discussed and analyzed in terms of the classical Titchmarsh-Weyl's theory for a singular second order differential equation. It is observed that the R matrix described as an abstract R operator is contained in the framework of Weyls classical extension to an infinite interval of finite Sturm-Liuoville theory. As a result they find that the exterior complex rotation method can be synthesized with the R matrix theory to obtain a method for deriving the S matrix poles out in the complex energy or momentum planes.

49016 (DOE/ER/60420—1, pp 81-94) **Lewis structures and Feynman diagrams: the treatment of geminal correlation in Fock space.** England, W.B.; Sorensen, T.E.; Silver, D.M. (Univ. of Wisconsin, Milwaukee). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Lipkin's method is used to rigorously transpose field-theoretic, self-consistent descriptions of Cooper pairs and Bose condensation to Lewis structures and resonance. The effective one-body equations can be simplified according to models of valence. The resultant self-consistent problem may require not much more work than the Hartee-Fock problem. The effort required for MBPT remains comparable to the Hartree-Fock case.

49017 (DOE/ER/60420—1, pp 95-107) **Solvable model with an extreme AGP ground state: relationships among fermion pairs, pairons, and natural spin geminals.** Larson, E.G. (Brigham Young Univ., Provo, UT). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A model many-fermion Hamiltonian is presented for which the ground state is asymptotically an Antisymmetrized Geminal Powers (AGP) wave function with largest possible greatest eigenvalue for its two-particle reduced density matrix. Closed analytical expressions and plane-wave expansions are presented for the generating geminal of the AGP ground state and for its one-particle reduced density matrix. The natural orbitals for this generating geminal are plane waves. The generating geminal shows intensely local character in its intracule and corresponds to the formation of a quasi-boson from two fermions. One may appropriately modify this generating geminal to introduce zero occupation numbers of its one-particle reduced density matrix and to make all the nonzero occupation numbers of its one-particle reduced density matrix equal, thus making this geminal a generator of an extreme AGP wave function, with an extreme large eigenvalue for its two-particle reduced density matrix. Closed analytical expressions are also given for this modified geminal and for its one-particle reduced density matrix. The similarities and differences of the features of this model and the accepted models of the superconducting ground state of electrons in metals, and the superfluid ground state of liquid He^4 are mentioned.

49018 (DOE/ER/60420—1, pp 109-117) **Momentum space approach to the relativistic atomic structure calculations.** Baretty, R.; Ishikawa, Y.; Nieves, J.F. (Univ. of Puerto Rico, Rio Piedras). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A simple and straightforward derivation of the relativistic no-pair equation in momentum space is given for hydrogenic species. This is achieved by starting with a QED Hamiltonian in momentum representation and making a rigorous reduction into a system that contains a single electron but no positrons. The integral equation was solved for a series of hydrogenic systems using the Kwon-Tabakin-Lande technique. Numerical results were compared with those recently obtained by Hess, who employed the basis set expansion technique to solve the no-pair equation in configuration space.

49019 (DOE/ER/60420—1, pp 119-127) **Method of complex scaling.** Braendas, E. (Univ. of Uppsala, Sweden). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The method of complex scaling is taken to include bound states, resonances, remaining scattering background and interference. Particular points of the general complex coordinate formulation are presented. It is shown that care must be exercised to avoid paradoxical situations resulting from inadequate definitions of operator domains. A new resonance localization theorem is presented.

49020 (DOE/ER/60420—1, pp 129-146) **Complex scaling method: application to autoionization, predissociation, and multiphoton resonances.** Chu, S. (Univ. of Kansas, Lawrence). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Several recent extensions of the method of complex scaling to the studies of autoionization, predissociation, and multiphoton dynamics will be presented. Specific subjects to be discussed include: (1) Complex-coordinate coupled-Landau-channel method for autoionizing resonances and photoionization of atomic hydrogen in intense magnetic fields, (2) Non-Hermitian complex quasi-energy method for multiphoton dissociation of small molecules with specific application to two-photon dissociation of vibrationally excited H_3^+ and HD^+, and (3) Vibrational predissociation of highly vibrationally excited He-I_2^* (nu) van der Waals molecules.

49021 (DOE/ER/60420—1, pp 147-151) **Sum-rules in resonance calculations with complex coordinates.** Winkler, P. (Univ. of Nevada, Reno). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Simple sum-rules that arise in connection with infinitesimal transformations have been set up and studied with respect to their use in assessing the quality of resonance calculations for cases in which no independent information on the metastable state is available.

49022 (DOE/ER/60420—1, pp 153-171) **Chemical graph-theoretic cluster expansions.** Klein, D.J. (Texas A & M Univ., Galveston). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

A general computationally amenable chemico-graph-theoretic cluster expansion method is suggested as a paradigm for incorporation of chemical structure concepts in a systematic manner. The cluster expansion approach is presented in a formalism general enough to cover a variety of empirical, semiempirical, and even ab initio applications. Formally such approaches for the utilization of chemical structure-related concepts may be viewed as discrete analogues of Taylor series expansions. The efficacy of the chemical structure concepts then is simply bound up in the rate of convergence of the cluster expansions. In many empirical applications, e.g., boiling points, chromatographic separation coefficients, and biological activities, this rate of convergence has been observed to be quite rapid. More note will be made here of quantum chemical applications. Relations to questions concerning size extensivity of energies and size consistency of wave functions are addressed.

49023 (DOE/ER/60420—1, pp 173-183) **Identification numbers for chemical structures.** Szymanski, K.; Mueller, W.R.; Knop, J.V.; Trinajstic, N. (Univ. of Duesseldorf, West Germany). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Several identification (ID) numbers for chemical structures (connectivity ID number, prime ID number, weighted ID number) are analyzed and tested until a counterexample (a pair of structures with the same ID number) is found. The analysis is carried out for acyclic structures with up to 20 atoms, trees with up to 20 points, benzenoid graphs and polyhexes with up to 10 hexagons, and all connected graphs with up to 6 points. Although all the (chemical) ID numbers studied are highly selective for many families of (molecular) graphs, none of them are unique; in all three cases the counterexamples are found. However, the greatest discriminative power is shown by the weighted ID number.

49024 (DOE/ER/60420—1, pp 471-481) **Gaussian wave-packet dynamics.** Arickx, F.; Broeckhove, J.; Coene, W.; Van Leuven, P. (Univ. of Antwerp, Belgium). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The time-dependent variational principle is applied to the manifold of Gaussian wave packets. The translational and spreading degrees of freedom are treated equally. Comparison is made with frozen Gaussian dynamics and with the exact Schroedinger dynamics.

49025 (DOE/ER/60420—1, pp 541-546) **Multichannel resonance optimization with an optical potential.** Garcia-Sucre, M.; Lefebvre, R. (Universite de Paris-Sud, Orsay, France). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The introduction of an appropriately chosen imaginary potential in the physical asymptotic region may transform a resonance wave function into an integrable function. They examine the conditions under which this procedure and the method of exterior complex scaling become equivalent. The procedure is tested in multichannel situations describing rotational predissociation of a van der Waals complex and Stark ionization of the hydrogen atom.

49026 (DOE/ER/60420—1, pp 585-601) **Polarization propagator analysis of through-space spin-spin coupling constants: ^{19}F-^{19}F couplings.** Ruiz de Azua, M.C.; Diz, A.C.; Giribet, C.G.; Contreras, R.H.; Rae, I.D. (Univ. de Buenos Aires, Argentina). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The through-space transmission of ^{19}F-^{19}F couplings is analyzed in a model compound employing inner projections of the polarization propagator, at the RPA and monoexcited CI levels, using an INDO ground state wave function. The emphasis of this work is (1) to study the dependence of the through-space transmitted component of such couplings on the interatomic F-F distance, and (2) to obtain an intuitive, although rigorous, model to describe the through-space transmission that could be used as a complementary tool in experimental measurements. In the first case an exponential decay is found and experimental data for different compounds are found to fit this curve fairly well. In the second case, localized molecular orbitals representing chemical functions are plotted, and the way in which they influence the through-space transmission is analyzed at the perturbator level as well as in inner projected polarization propagator terms. The important role played by the anti-bonding orbitals and the lone pairs of the F atoms is discussed.

49027 (DOE/ER/60420—1, pp 743-748) **Comments on the method of complex scaling to find physical resonance states.** Loewdin, P.O. (Univ. of Florida, Gainesville). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Some basic features of the method of complex scaling are briefly reviewed. This method is associated with a similarity transformation anti $H = UHU^{-1}$, in which the many-particle Hamiltonian H loses its self-adjoint character. In connection with the eigenvalue problems for anti H and H, one has formally the relations anti Psi = U Psi and anti E = E. However, since the proper boundary conditions have to be satisfied, the spectrum {anti E} may still be subject to change: even if some eigenvalues are persistent (anti E = E), others may be lost, and new eigenvalues may occur also in the complex plane. It is pointed out that these changes are related to the fact that the dilatation operator U is an unbounded operator, and that the eigenfunctions involved are transformed not only within the ordinary L^2 Hilbert space, but also out of and into this space. Reference to a more complete treatment is given.

49028 (DOE/ER/60420—1, pp 767-768) **Formulation of the Hohenberg-Kohn-Sham theory.** Keller, J. (Universidad Nacional Autonoma de Mexico). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The formal structure of density functional theory should include a third theorem stating that: the internal symmetry of the system, through a set of parameters {c/sub i,N/}, is a necessary part of the theory. The variational equations should read $\delta E[rho;\{c/sub\ i,N/\}] = 0$, and the parameters C/sub i,N/ included either in the construction of the density function (as in the Kohn-Sham procedure) or in the energy functional itself.

49029 (DOE/ER/60420—1, pp 769-771) **Remarks about the wave-function representability of the first-order reduced density matrices.** Loewdin, P.O. (Univ. of Florida, Gainesville). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

It is pointed out that, if {Gamma/sub y/} is the set of Nth-order density matrices associated with a given first-order reduced density matrix $y = y(x_1/x'_1)$, then y is wave-function representable, if and only if there is at least one Gamma/sub y/ for which one has $\mu = Tr(Gamma/sub\ y/ - Gamma/sub\ y/^2) = 0$.

49030 (DOE/ER/60420—1, pp 773-785) **Collisional time-correlation functions for molecular interactions.** Micha, D.A. (Univ. of Florida, Gainesville). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

Collisional time-correlation functions (TCFS) combine methods of scattering theory and of many-body theory to describe the interaction of projectiles with complex targets. In recent work, they have developed the theory of collisional TCFS for molecular interactions using multiple scattering expansions, semiclassical approximations and operator algebras. The theory has been applied to atomic collisions with molecules, to calculate cross sections and compare them with experiment.

49031 **(IFVE-OTF—86-42) Quantum theory of string in the four-dimensional space-time.** Pron'ko, G.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703253.

Submitted to the journal Theor. Math. Phys. .

The Lorentz invariant quantum theory of string is constructed in four-dimensional space-time. Unlike the traditional approach

whose result was breaking of Lorentz invariance, our method is based on the usage of other variables for description of string configurations. The method of an auxiliary spectral problem for periodic potentials is the main tool in construction of these new variables. 12 refs.

49032 **(IFVE-OTF—86-138) New notions about space-time and gravitation.** Logunov, A.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1986. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703259.

Critical analysis of the general theory of relativity (GTR) is briefly described. Acceptance of its conception is shown to lead to dropping a series of fundamental physical representations being the basis for physics. Firstly, it is giving up from the conservation laws of energy-momentum and angular momentum of matter and gravitational field all together. Secondly, it is giving up from the representation of the gravitational field as a classical one of the Faraday-Maxwell type with density of energy-momentum. 14 refs.

49033 (INIS-SU—415, pp 37-47) **Open quantum system of two coupled harmonic oscillators.** Sandulescu, A.; Scutaru, H.; Scheid, W. (Joint Inst. for Nuclear Research, Dubna, USSR. Lab. of Theoretical Physics; Institutul Central de Fizica, Bucharest, Romania; Giessen Univ., Germany, F.R. Inst. fuer Theoretische Physik). 1986. NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178. (N—18-86).

In JINR rapid communications. Collection.

On the basis of the Lindblad theory for open quantum systems master equations for a system consisting of two harmonic oscillators are derived. The time dependence of expectation values, Wigner function and Weyl operator are obtained and discussed. The chosen system can be applied for the description of the charge and mass asymmetry degrees of freedom in deep inelastic collisions in nuclear physics. 7 refs.

49034 **(INIS-SU—415) JINR rapid communications. Collection.** (Joint Inst. for Nuclear Research, Dubna (USSR)). 1986. 66p. (N—18-86). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780178.

Individual papers have been cataloged separately. (WRF)

49035 **(INS—565) Microscopic theory of dynamical subspace for large amplitude collective motion.** Sakata, Fumihiko; Marumori, Toshio; Ogura, Masanori. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jan 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702911.

A full quantum theory appropriate for describing large amplitude collective motion is proposed by exploiting the basic idea of the semi-classical theory so far developed within the time-depedent Hartree-Fock theory. A central problem of the quantum theory is how to determine an optimal representation called a dynamical representation specific for the collective subspace where the large amplitude collective motion is replicated as precisely as possible. As an extension of the semi-classical theory where the concept of an approximate integral surface played an important role, the collective subspace is properly characterized by introducing a concept of an approximate invariant subspace of the Hamiltonian.

49036 **(INS—591) Connections between Schwinger terms and anomalies.** Tomiya, Mitsuyoshi. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). Jun 1986. 57p. NTIS (US Sales Only), PC A04/MF A01. File Number DE87702917.

We present examples of a new type of Schwinger terms appearing in commutators of energy-momentum tensor. We demonstrate them in two-dimensional flat Minkowski space. The Schwinger terms which correspond to gravitational anomaly appear in different places from those of conformal anomaly. Nevertheless, they still preserve the Jacobi identity. We also discuss the relation between anomalies and the Schwinger terms. In any-dimensional curved space-time Faddeev's cohomological technique works well. Therefore we can derive the Schwinger terms in curved space-time.

49037 **(JINR-R—2-86-571) Separation of variables in the Hylleraas equation.** Vinitskij, S.I.; Sisakyan, A.N.; Pogosyan, G.S.; Ter-Antonyan, V.M. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 5p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703321.

The Hylleraas equation is found for a hydrogen atom in an arbitrary-dimensional momentum space. Solutions are obtained for the discrete spectrum of the one- and two-dimensional Hylleraas equation. It is shown that the coefficients realizing expansions of polar and bipolar bases of a two-dimensional hydrogen atom are expressed in terms of the Wigner D-functions of angles $\pi/2$. 6 references.

49038 **(JINR-R—4-86-244) Asymptotics of the effective potentials and wave functions of a three-body problem in suitable coordinates.** Vinitskij, S.I.; Kadomtsev, M.B. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703323.

Submitted to the journal J. Phys. B: Lett. to the Editor.

An equivalent operator removing degeneration in a layer with the principal quantum number n is recognised for the two-center Coulomb problem in suitable coordinates at large distances between the centres. Averaging of the total Hamiltonian over the correct zero-order adiabatic functions allows one to write down the asymptotic system of equations. The solution of this system of equations is found that is compatible with the physical boundary conditions of the scattering problem. 7 references.

49039 **(JINR-R—4-86-439) Adiabatic representation of a three-body problem in the limit of separated atom in natural coordinates.** Vinitskij, S.I.; Vukajlovich, F.R.; Kadomtsev, M.B. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1986. 19p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703324.

Submitted to the journal J. Phys.

For the two-center problem in the limit of separated atoms an equivalent operator Λ-vector is found removing the Coulomb degeneracy in the second order of perturbation theory. Eigenvalues and eigenfunctions of the operator Λ-vector allow to construct a complete classification of states of the two-center problem in suitable coordinates, a compatible adiabatic basic (CAB). Averaging of the total Hamiltonian of a three-body problem over the CAB in a system of adiabatic equations in slow variable R the hyperradius of the three-body problem. It is shown that the asymptotics of that system of equations is compatible with the physical boundary conditions of the scattering problem. 25 references, 2 figures, 1 table.

49040 **(LA-UR—87-2851) Light scattering by oriented and randomly dispersed chiral particles.** Singham, S.B. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 11p. (CONF-8706199—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014758.

From CRDEC scientific conference on obscuration and aerosol research; Aberdeen, MD, USA (1 Jun 1987).

The use of coupled dipoles in modelling light scattering by oriented and randomly dispersed chiral particles is examined in this paper. The chirality considered here is form chirality which results from macroscopic structural mirror asymmetry in the particle. For a chiral particle described by spherical dipoles, it is shown that large magnitude terms that contribute the chiral matrix elements of an oriented particle do not contribute at all in the orientation average. This result will be used in future work to obtain a more efficient method of evaluating light scattering by randomly dispersed chiral particles.

49041 **(OUP—87-16) Harmonic oscillator at finite temperature using path integrals.** Larsen, Aa.; Ravndal, F. (Oslo Univ. (Norway). Fysisk Inst.). May 1987. 20p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752524.

The statistical mechanics of a quantum harmonic oscillator can easily be formulated in terms of Feynman path integrals in imaginary time. By straightforward integrations one finds the parti-

tion function, the internal energy and correlation functions. When time is discretized, the same results can be obtained directly using Monte Carlo methods on a computer. In the zero temperature limit one recovers the usual quantum mechanical results.

49042 **(RRK—86-42) On the gravitational instability in an infinite homogeneous medium.** Nariai, Hidekazu. (Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics). Oct 1986. 14p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703042.

In the Research Note dated on June 4th in 1956, I worked out the gravitational instability in an infinite homogeneous medium, as an extension of Jeans' original work in the case where the medium is of a finite viscosity and a nonvanishing heat conductivity. The contents seem to be of a physical meaning even at the present epoch, so that I will reproduce them.

49043 **(RRK—86-44) On some higher-dimensional space-times.** Nariai, Hidekazu. (Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics). Oct 1986. 6p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87703044.

In 1985, I and Ishihara considered an extension of de Sitter and Nariai's solutions of R/sub $\mu\nu$/ = Λg/sub $\mu\nu$/ in a higher dimensional spacetime. This is a sequel to the above paper in the case where the 6-dimensional space-time consists of 4-dimensional isotropic homogeneous space and two-dimensional space with Kantowski-Sach's form. It is shown that the vacuum equations admit such a solution that the 4-dimensional space is 3 famous forms of the de Sitter space-time and the 2-dimensional one is Nariai's static form.

49044 **Second-quantized molecular time scale generalized Langevin equation theory and the quantum oscillator.** McDowell, H.K. (CLS-2 MS G738, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* **87**: No. 8, 4859-4864(15 Oct 1987).

The short-time Gaussian approximation to the molecular time scale generalized Langevin equation (MTGLE) friction kernel is introduced and used to compute the time dependence of a fluctuation time correlation function. The fluctuations are shown to have two time scales, namely, the dissipation time scale and a quantum time scale given by exp[-2πkTt/h-dash-bar]. Absorption and emission spectral functions for a quantum oscillator coupled to a bath are derived with no approximations made. The second-quantized MTGLE approach is applied to the problem of a quantum oscillator coupled linearly to a bath of quantum oscillators. The method is shown to be consistent with previous work and to provide a systematic methodology to examine more general many-body boson problems.

49045 **Multiplex advantage in Hadamard transform spectrometry utilizing solid-state encoding masks with uniform, bistable optical transmission defects.** Tilotta, D.C.; Hammaker, R.M.; Fateley, W.G. (Kansas State University, Chemistry Department, Manhattan, Kansas 66506). *Applied Optics;* **26**: No. 19, 4285-4292(1 Oct 1987).

The effect of a uniform bistable optical transmission defect in the encoding mask on the multiplex efficiency is investigated for solid-state Hadamard transform spectrometry with thermal detection. It is demonstrated that encoding masks which possess nonideal optical transmission properties, i.e., bistable transmission defects, need not impare the multiplex capability provided a sufficient number of resolution elements are multiplexed. Application to the SNR of a general algorithm for the calculation of the average mean square error in the estimate of the spectrum shows that reasonable SNR improvements can be expected when compared to conventional dispersive instruments.

49046 **Crisis in the Belousov—Zhabotinskii reaction: Experiment and simulation.** Richetti, P.; De Kepper, P.; Roux, J.C.; Swinney, H.L. (Centre de Recherche Paul Pascal, Universite de Bordeaux-I, 33405 Talence Cedex, France). *Journal of Statistical Physics;* **48**: No. 3, 977-990(Sep 1987).

An abrupt transition that has the character of an interior crisis was observed in an experiment on the Belousov—Zhabotinskii reaction as a control parameter was varied (a crisis is a qualitative change in the dynamics of a system observed when an attractor collides with the stable manifold of a fixed point). The interpretation of the observed behavior as a crisis is corroborated by a numerical analysis of a seven-variable model of the reaction. The waveforms, attractors, and maps obtained in the simulation are remarkably similar to those obtained in the laboratory experiment. The simulation indicates that the crisis is a consequence of a multivalued first return map.

49047 **Self-consistent equations for variable velocity three-dimensional inverse scattering.** Rose, J.H.; Cheney, M. (Center for NDE, Iowa State University, Ames, Iowa 50011). *Physical Review Letters;* **59**: No. 9, 954-957(31 Aug 1987).

This paper considers the three-dimensional inverse scattering problem for the wave equation with variable velocity. A possible solution is presented in terms of equations whose self-consistent solution determines the velocity from scattering data. These self-consistent equations are (1) the wave equation in integral form, (2) a linear integral equation which relates the wave field and scattering data, and (3) a novel formula for the velocity in terms of the wave field.

49048 **Measurement of longitudinal coherence lengths in particle beams.** Bernstein, H.J.; Low, F.E. (School of Natural Science, Hampshire College, Amherst, Massachusetts 01002). *Physical Review Letters;* **59**: No. 9, 951-953(31 Aug 1987).

We point out that, on very general grounds, experiments with directionally collimated beams (of neutrons or other particles) incident on passive targets cannot distinguish between their coherent wave-packet structure and the incoherent mixing due, for example, to multiple emitters or to interactions with other particles in the source.

49049 **Periodic trajectories for a two-dimensional nonintegrable Hamiltonian.** Baranger, M.; Davies, K.T.R. (Center for Theoretical Physics, Laboratory for Nuclear Science, and Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Annals of Physics (New York);* **177**: No. 2, 330-358(1 Aug 1987).

A numerical study is made of the classical periodic trajectories for the two-dimensional nonintegrable Hamiltonian H = 1/2(p^2/sub x/+p^2/sub y/)+(y-1/2x^2)^2+0.05 x^3. In addition to x—y pictures of the trajectories, E—tau (energy—period) plots of the periodic families are presented. Efforts have been ade to include all trajectories with short periods and all simple branchings of these trajectories. The monodromy matrix has been calculated in all cases, and from it the stability properties are derived. The topology of the E—tau plot has been explored, with the following results. One family may have several stable regions. The plot is not completely connected; there are islands. The plot is not a tree; there are cycles. There are isochronous branchings, period-doublings, and period-multiplyings of higher orders, and examples of each of these are presented. There is often more than one branch issuing from a branch point. Some general empirical rules are inferred. In particular, the existence of isochronous branching is seen to be a consequence of the symmetry of the Hamiltonian. All these results agree with the general classification of possible branchings derived in Ref. [10]. (M. A. M. de Aguiar, C. P. Malta, M. Baranger, and K. T. R. Davies, in preparation). Finally, some nonperiodic trajectories are calculated to illustrate the fact that stable periodic trajectories lie in "regular" regions of phase space, while unstable ones lie in "chaotic" regions.

49050 **Hard-sphere heat conductivity via nonequilibrium molecular dynamics.** Kratky, K.W.; Hoover, W.G. (Institut fuer Experimentalphysik, Universitaet Wien, A-1090 Wien, Austria). *Journal of Statistical Physics;* **48**: No. 2, 873-900(Aug 1987).

We use an Evans—Gillan driving force F/sup //sup d/, together with isokinetic and isoenergetic constraint forces F/sup //sup c/, to drive steady heat currents in periodic systems of 4 and 32 hard spheres. The additional driving and constraint forces produce

curved trajectories as well as additional streaming and collisional contributions to the momentum and energy fluxes. Here we develop an analytic treatment of the collisions so that the simulation becomes approximately ten times faster than our previous numerical treatment. At low field strengths λ, for λσ less than 0.4, where σ is the hard-sphere diameter, the 32-sphere conductivity is consistent with Alder, Gass, and Wainwright's 108-sphere value. At higher field strengths the conductivity varies roughly as λ/sup 1/2/, in parallel with the logarithmic dependence found previously for three hard disks.

49051 **Gravitational field with toroidal topology.** Stewart, B.W.; Witten, L.; Papadopoulos, D. (Univ. of Cincinnati, OH). *General Relativity and Gravitation;* **19**: No. 8, 827-839(Aug 1987). Contract FG02-84ER40153.

The Weyl formalism for static, axially symmetric solutions to Einstein's equations is employed to examine solutions of Einstein's equations with toroidal topology. They investigate a particular family of solutions that contain the Schwarzschild, Curzon, Bach-Weyl, and γ metric (also known as the Zipoy-Voorhees metric) as special cases.

49052 **Cosmological textures.** Davis, R.L. (Stanford Univ., CA). *General Relativity and Gravitation;* **19**: No. 4, 331-337(Apr 1987). Contract AC03-76SF00515.

The notions of phase transition and causality, combined with the standard cosmological model, lead to the appearance of topological defects in the early universe. The most familiar types of defects are solitons, strings, and domain walls. Another type can exist when the spatial universe is compact. When these appear the whole universe takes on a winding number, and the consequences are quite amusing; for example, it is possible that a closed universe can mimic open or flat universes. Another possibility is that the vacuum has a nonabelian magnetic field strength at all points in the universe.

49053 **Feeble forces and gravity.** Bars, I.; Visser, M. (Univ. of Southern California, Los Angeles). *General Relativity and Gravitation;* **19**: No. 3, 219-223(Mar 1987). Contract FG03-84ER40168.

The authors develop a scenario in which feeble intermediate range forces emerge as an effect resulting from the compactification (a la Kaluza-Klein) of multidimensional theories. These feeble forces compete with gravity and in general permit different bodies to fall to earth with different accelerations. They show that these feeble forces are mediated by vectors (V) and/or scalars (S), whose dimensionless coupling constants are typically of order g/sub v/ ≈ g/sub s/ ≈ 10^{-20}. Under certain plausible assumptions the ranges of these feeble forces are expected to be of order 1 m to 1 km. It is conjectured that the general strategy will prove applicable to realistic multidimensional theories such as the 10-dimensional superstring theories. They speculate that deviations from the standard gravitational force - similar to the ones reported recently as a fifth force - may be interpreted as evidence for higher dimensions.

70 FUSION ENERGY

REFER ALSO TO CITATION(S) 47805

49054 **(INIS-SU—409) Experimental and theoretical physics. Collection.** (AN SSSR, Moscow. Fizicheskij Inst.). 1986. 53p. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780002.

Kratkie Soobshcheniya po Fizike.; (no.10).
Individual papers have been cataloged separately. (WRF)

49055 **(INIS-SU—413) Quantum radiophysics. Collection.** (AN SSSR, Moscow. Fizicheskij Inst.). 1985. 73p. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780003.

Kratkie Soobshcheniya po Fizike.; (no.12).
Individual papers have been cataloged separately. (WRF)

7001 Plasma Research

REFER ALSO TO CITATION(S) 48722, 48744, 48744, 49115, 49116, 49117, 49119, 49128, 49130, 49138, 49140

49056 **(ANL/FPP—87-3) TIBER II/ETR: Nuclear Performance Analysis Group Report.** (Argonne National Lab., IL (USA)). Sep 1987. Contract W-31109-ENG-38. 311p. NTIS, PC A14/MF A01; 1; GPO Dep. File Number DE88000449.

A Nuclear Performance Analysis Group was formed to develop the nuclear technology mission of TIBER-II under the leadership of Argonne National Laboratory reporting to LLNL with major participation by the University of California - Los Angeles (test requirements, R & D needs, water-cooled test modules, neutronic tests). Additional key support was provided by GA Technologies (helium-cooled test modules), Hanford Engineering Development Laboratory (material-irradiation tests), Sandia National Laboratory - Albuquerque (high-heat-flux component tests), and the Idaho National Engineering Laboratory (safety tests). Support also was provided by Rennselaer Polytechnic Institute, Grumman Aerospace Corporation, and the Canadian Fusion Fuels Technology Program. This report discusses these areas and provides a schedule for their completion.

49057 **(CONF-8710140—1) Feasibility study of an infrared interferometer/polarimeter system for CIT [Compact Ignition Tokamak].** Ma, C.H.; Hutchinson, D.P. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 4p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014945.

From 3. international symposium on laser-aided plasma diagnostics; Los Angeles, CA, USA (28 Oct 1987).

The results of a feasibility study of a two-dimensional infrared interferometer/polarimeter system for measurements of electron density and plasma current profiles in the Compact Ignition Tokamak (CIT) are presented. A preliminary design of the system is discussed.

49058 **(DOE/ER/53212—110) Interchange stability of noncircular reversed field pinches.** Skinner, D.A.; Prager, S.C.; Todd, A.M.M. (Wisconsin Univ., Madison (USA). Plasma Physics Research). Aug 1987. Contract FG02-85ER53212. 20p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000177.

Interchange (Mercier) stability of toroidal reversed-field-pinch plasmas with noncircular cross-section is evaluated numerically. Marginally stable pressure profiles and beta values are produced. Most shapes, such as indented or vertically elongated, reduce stability by making the net magnetic curvature of the poloidal-field-dominated plasmas yet worse than that of the circle. Horizontally elongated plasmas slightly enhance stability beyond that of the circle as a result of increased shear produced by toroidicity. Such shear enhancement by the toroidal shift of magnetic surfaces might be exploited for future, more comprehensive studies.

49059 **(DOE/ET/53017—81) Field-reversing electron and ion rings for the confinement and heating of plasmas: Annual progress report for the period September 1, 1986-August 31, 1987.** Fleischmann, H.H. (Cornell Univ., Ithaca, NY (USA)). 1 Sep 1987. Contract AC02-76ET53017. 5p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014669.

This paper updates experiments being done on the confinement and heating of plasma at Cornell University. Such experiments discussed are: megavolt ion coil experiment, the MERGE experiment on the merging of plasma and electron rings, precessional stabilization of rings in resistive walls, and theoretical investigation on ion-ring equilibria. (LSP)

49060 **(DOE/ET/53088—296) Saturation of Kelvin-Helmholtz fluctuations in a sheared magnetic field.** Scott, B.D.; Terry, P.W.; Diamond, P.H. (Texas Univ., Austin (USA). Inst. for Fusion Studies). Aug 1987. Contract FG05-80ET53088. 46p. (IFSR—296). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000276.

Kelvin-Helmholtz unstable flows are numerically investigated in the context of a sheared E x B flow profile and a sheared magnetic field in the collisional, electrostatic limit. In the extreme form of this limit, density fluctuations are small, and the system is described by the nonlinear E x B vorticity dynamics. In order to focus on the role of magnetic shear localization, the computations are confined to two dimensions. For weak magnetic shear the fluctuations become turbulent and saturate by nonlinear cascade to small (dissipative) scales. In a strong magnetic shear regime near the linear stability boundary, nonlinear spatial broadening allows direct access to resistive shear dissipation, leading to saturation at small amplitude with nearly all the fluctuation energy in the longest-wavelength mode. This is in accordance with previous investigation using a statistical closure analysis. The amount of broadening is proportional to the linear growth rate. The fluctuation amplitude scaling with magnetic shear is found to agree closely with the theory.

49061 **(DOE/ET/53088—297) On tokamak equilibrium.** Hazeltine, R.D.; Montgomery, M.H. (Texas Univ., Austin (USA). Inst. for Fusion Studies). Aug 1987. Contract FG05-80ET53088. 21p. (IFSR—297). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014811.

Large aspect-ratio tokamak equilibrium is studied, including effects, such as ellipticity of the flux surfaces, of second order in the inverse aspect ratio. To facilitate the interpretation of experimental data, the analysis uses simple coordinates that are readily evaluated, rather than coordinates based on the exact flux surfaces. An explicit formula for the safety factor, including second order terms, is presented, along with a brief discussion of rotational effects.

49062 **(EUR-CEA-FC—1281) Kinetic equation for a magnetized plasma.** Ghendrih, P.; Misguich, J.H. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Dept. de Recherches sur la Fusion Controlee). Jul 1986. 106p. NTIS (US Sales Only), PC A06/MF A01. File Number DE87752592.

The effect of the magnetic field on the collision operator of a two-species hot plasma is described without approximation on the strength of the field. The motivation consists to describe microscopic relaxation processes in the intermediate range of values of the field, as can be found in Tokamak plasmas. From the Klimontovich equation, the generalization of the Landau equation is derived by taking into account both the effects of the magnetic field and those of the space non-homogeneity. The original technique used is based on the propagator formalism and on a systematical use of the rotation matrices describing the Larmor rotation of the particles. Simpler explicit results are also given for the cases of (i) a homogeneous two-species plasma, and of (ii) a non-homogeneous single-species plasma. In analogy with cosmic ray turbulent diffusion, a singular contribution is found for collisions between particles with the same velocity parallel to the magnetic field. The previously-known limit results for infinite and vanishing field are unable to describe the results obtained here for intermediate values of the strength of the field, where non-negligible effects are expected on transport coefficients.

49063 **(EUR-CEA-FC—1309) General approach to the computation of local transport coefficients with finite Larmor effects in the collision contribution.** Ghendrih, P. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Dept. de Recherches sur la Fusion Controlee). Oct 1986. 36p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752593.

We expand the distribution functions on a basis of Hermite functions and obtain a general scheme to compute the local transport coefficients. The magnetic field dependence due to finite Larmor radius effects during the collision process is taken into account.

49064 **(EUR-CEA-FC—1310) Cross effects on electron-cyclotron and lower-hybrid current drive in tokamak plasmas.** Fidone, I.; Giruzzi, G.; Krivenski, V.; Mazzucato, E.; Ziebell, L.F. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Dept. de Recherches sur la Fusion Controlee). Nov 1986. 23p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752594.

Electron cyclotron resonance current drive in a tokamak plasma in the presence of a lower hybrid tail is investigated using a 2D Fokker-Planck code. For an extraordinary mode at oblique propagation and down-shifted frequency it is shown that the efficiency of electron cyclotron current drive becomes, i) substantially greater than the corresponding efficiency of a Maxwellian plasma at the same bulk temperature, ii) equal or greater than that of the lower hybrid waves, iii) comparable with the efficiency of a Maxwellian plasma at much higher temperature. This enhancement results from a beneficial cross-effect of the two waves on the formation of the current carrying electron tail. (5 fig; 17 refs).

49065 **(EUR-CEA-FC—1313) Hyperfrequency reflectometry for determination of electron density and its fluctuations on Petula-B tokamak.** Bottollier-Curtet, H. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Dept. de Recherches sur la Fusion Controlee). Nov 1986. 185p. (In French). NTIS (US Sales Only), PC A09/MF A01. File Number DE87752596.

The physical principle of reflectometry is shown in dealing with wave propagation and reflection in an inhomogeneous and anisotropic plasma and in clarifying electron density profile and density fluctuation measurement. Then the experimental device made of three different micro-wave circuits is described together with solutions brought according to each circuit to optimize them. Experimental results are given, and particularly the first whole electron density profile of a tokamak which has been got by reflectrometry. Sine-cosine analysis of MHD fluctuations which allow the density fluctuation localisation in the plasma. Result discussion is about propagation wave in plasma as much as about numerical processes or experimental cautions. Comparative study is made between ordinary wave mode reflectometry and extraordinary one. This will allow a configuration proposition of reflectometer for Tore Supra. (54 figs; 30 refs).

49066 **(IAE—4214/7) Mathematical models of plasma discharge control in a tokamak.** Andreev, V.F.; Dnestrovskij, Yu.N.; Kostomarov, D.P.; Popov, A.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1985. 28p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. File Number DE87702891.

A model for program description of discharge development in a tokamak is considered and the problem of optimal control of poloidal fields and total current in plasma is determined. A comparison of the formulated problem solution methods is performed. A "quasi-optimal" control model is proposed, allowing one to take account of real power supplies. Analysis of the control task stability and correctness is conducted. The numerical code for otimal control task solution is developed and the method is described. Different operation modes of the T-15 device are calculated using the developed code. 11 refs.; 10 figs.

49067 **(INIS-mf—10687) On the theory of the electrical field and the plasma rotation in the stellarator.** Coronado-Gallardo, M. (Technische Univ. Muenchen, Garching (Germany, F.R.). Fakultaet fuer Physik). 23 Jul 1984. 61p. (In German). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752782.

In the context of neoclassical transport theory, the macroscopic torque equations for several liquids in toroidal plasmas are used with general geometry. In order to examine plasma rotation and the electrical field in equilibrium and the effect of sources of particles and pulses, the continuity and pulse balance equations are dealt with. In order to use them on the WVII-A stellarator in the Max Planck Institute for Plasma Physics, existing formulae are ex-

panded and the viscosity tensor is calculated in the CGL form in the plateau range. General expressions for plasma speed, electrical field, plasma diffusion and current are obtained, in which the effect of the sources occurs explicitly. The theory is applied to the WVII-A stellarator, in which neutral particle injection represents one pulse source.

49068 (INIS-SU—409, pp 17-19) **Measurement of plasma current induced by relativistic electron beam.** Bondar', Yu.F.; Mkheidze, G.P.; Savin, A.A. (AN SSSR, Moscow. Inst. Obshchej Fiziki). 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780002.

Kratkie Soobshcheniya po Fizike.; (no.10).
In Experimental and theoretical physics. Collection.

The results of experimental investigation of plasma current induced in the course of the injection of high-current relativistic electron beam (REB) into neutral gas are presented. The technique by means of which one succeeded in measuring directly the induced current and determining its distribution by plasma channel cross section is described. The results obtained show that the dynamics of plasma currents induced in the course of REB injection into gas is the complex process of selfconsistent interactions of beam induced fields plasma channel conductivity etc. 2 refs.; 2 figs.

49069 (INIS-SU—409, pp 5-6) **Self-oscillation regime of directional velocity relaxation of electron flux.** Vedenin, P.V.; Ignatov, A.M. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780002.

Kratkie Soobshcheniya po Fizike.; (no.10).
In Experimental and theoretical physics. Collection.

The relaxation of the superalfven electron flux moving in the weakly ionized plasma is theoretically investigated. It is shown that at a rather low rate (under the conditions of Ramzauer effect) current self-oscillations can arise. 3 refs.; 2 figs.

49070 (INIS-SU—409, pp 7-10) **Stationary electroacoustic p-polarized waves in nonisothermal plasma.** Krokhin, O.N.; Tsybenko, S.P. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780002.

Kratkie Soobshcheniya po Fizike.; (no.10).
In Experimental and theoretical physics. Collection.

Nonlinear electrodynamics equations for p-polarized electromagnetic field with regard to effects of space dispersion and plasma motion are investigated. The stationary periodic solutions of equations are found whereas in case of skinning field - soliton solution. 11 refs.

49071 (INIS-SU—409, pp 11-12) **Stationary regime of s-polarized electromagnetic wave reflection from one-dimensional drop of plasma density.** Krokhin, O.N.; Tsybenko, S.P. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE87780002.

Kratkie Soobshcheniya po Fizike.; (no.10).
In Experimental and theoretical physics. Collection.

It is shown that under the reflection of electromagnetic S-polarized wave from one-dimensional drop of plasma density in certain conditions the stationary electroacoustic wave is formed. The frequency of the reflected wave differs from the frequency incident on the value proportional to the electroacoustic wave velocity. 6 refs.

49072 (INIS-SU—413, pp 17-21) **Method of emission and interferometric tomography of a laser plasma.** Denisov, V.I.; Zakharenkov, Yu.A.; Kologrivov, A.A. 1985. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780003.

Kratkie Soobshcheniya po Fizike.; (no.12).
In Quantum radiophysics. Collection.

Algorithm of tomographic restoration of luminosity and dense inhomogeneous laser plasma electron concentration is developed taking account of the real beam trajectories. The restoration accuracy is checked in the model calculations. Reconstruction of the three-dimensional distribution of plasma X-ray emission is performed on the "Kalmar" device. 6 refs.; 3 figs.

49073 (INIS-SU—417, pp 58-61) **On the interaction of electron beam with magnetic fields in a laser plasma.** Kotel'nikov, S.S.; Lebo, I.G.; Rozanov, V.B. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780004.

Kratkie Soobshcheniya po Fizike.; (no.12).
In Quantum radiophysics. Collection.

A problem on electron beam scattering on poloidal magnetic fields in laser target is considered. Measurement of the scattering differential cross-section permits to determine the number of developing most intensively magnetic field harmonics and maximum deviation angle enables to define the field quantity. 3 refs.; 3 figs.

49074 (INIS-SU—419, pp 24-26) **Dynamics of Pierce instability of hot electron beams.** Ignatov, A.M.; Novikov, V.N. 1986. (In Russian). NTIS (US Sales Only), PC A04/MF A01. File Number DE88780005.

Kratkie Soobshcheniya po Fizike.; (no.8).
In Experimental and theoretical physics. Collection.

On the base of a new method of numerical solution of the Vlasov equation evolution of complete function of electron distribution at the injection of hot electron beams into plasma bounded with electrodes is investigated. It is shown that despite the development of electrostatic instabilities in the system the currents can run substantially exceeding the Pierce critical current. 5 refs.; 3 figs.

49075 (IPPJ—762) **Lectures on topics in magnetic reconnection and transport in fusion devices.** Kulsrud, R.M. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Jan 1986. 66p. NTIS (US Sales Only), PC A04/MF A01. File Number DE87702931.

Magnetic reconnection is of considerable importance for the confinement of plasma in fusion devices. In these lectures, three topics in which magnetic reconnection plays an important role. The first is the formation of magnetic islands in the magnetostatic equilibrium for the systems of imperfect symmetry. Magnetic reconnection occurs during the evoluation of the equilibrium. The second concerns the additional breakup of magnetic surfaces due to nonideal instability such as resistive modes or drift waves. The third is the tearing modes which are actually observed to break up magnetic surfaces and to form islands. An approximate treatment of an equilibrium that has islands indicates that the tearing mode is indeed unstable when it is expected to be. The objective of another lecture is to give an intuitive picture of the particle motion that leads to so-called ripple transport in stellarators and other nonaxisymmetric geometries such as heliotrons and torsatrons. There is the possibility of a simple intuitive discussion of stellarator transport, and though this intuitive treatment is not as accurate as the transport calculation in tokamaks, it is adquate to form an idea as to the importance of ripple transport for Stellarator confinement. (Kako, I.).

49076 (IPPJ—771) **Sustaining a steady-state field-reversed configuration.** Okamoto, Masao. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Mar 1986. 21p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702932.

A method is considered to sustain the steady-state field-reversed configuration by driving the bootstrap current. A consistent steady-state solution is obtained within a framework of one dimensional one-fluid equations including equilibrium. It is found that the amount of seed current necessary to induce the bootstrap current (or diamagnetic current) maintaining the steady state depends strongly on the transport and loss rate of plasma particles.

49077 (IPPJ—784) **Plasma confinement by a radio frequency plugging potential in an axisymmetric mirror-cusp device.** Kumazawa, R.; Okamura, S.; Adati, K. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Jul 1986. 19p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702934.

RFC-XX-M is an MHD stable and axisymmetric mirror-cusp device with radio frequency (RF) plugging. The plasma is produced by ion cyclotron resonant heating (ICRH) with gas puffing at the central mirror. The total ion energy confinement time including axial loss, electron drag and charge exchange is improved by a

factor of three by the RF plugging and reaches 1 ms. The energy confinement time due to the axial particle loss is estimated to be 7.5 ms from a detailed analysis of ion energy loss channels. An RF plugging potential (psi) is measured from the energy analysis of the escaping ions. It is determined that psi is proportional to the square of an applied RF voltage and the maximum value reaches 250 V. This value agrees with a plugging potential deduced from the Pastukhov formula within a factor of 2.

49078 **(IPPJ—787) Electron density diagnostics by FE XXII line intensity ratio.** Masai, Kuniaki; Kato, Takako. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Aug 1986. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702935.

The electron density of a tokamak plasma is obtained by measuring the ratio of the line intensities for Fe XXII 2s/sup 2/ 2p(/sup 2/P/sub 3/2/) - 2s2p/sup 2/(/sup 2/P/sub 3/2/) 114 A and 2s/sup 2/2p(/sup 2/P/sub 1/2/) - 2s2p/sup 2/(/sup 2/S/sub 1/2/) 117 A. The intensity ratio of these lines is found useful for the density diagnostics in the range 10/sup 12/ - 10/sup 15/ cm/sup -3/, on account of its weak dependence on the temperature and of the proximity of these wavelengths. Proton and deuteron impacts are important for excitation from 2s/sup 2/2p(/sup 2/P/sub 1/2/) to 2s/sup 2/2p(/sup 2/P/sub 3/2/) and the resultant intensity for 114 A.

49079 **(IPPJ—789) Volume produced H/sup -/, D/sup -/ ion source for proton accelerator and thermo-nuclear fusion research by sheet plasma, (2).** Uramoto, Joshin. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Aug 1986. 19p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702936.

By increasing thicknesses of multi-aperture electrodes to extract volume produced H/sup -/, D/sup -/ ions from the sheet plasma, electron currents accelerated together with H/sup -/, D/sup -/ ions, are reduced to around 10 % of the H/sup -/, D/sup -/ ion current with a current density of 20 — 30 mA/cm/sup 2/ over a large area. Accordingly, a total heat load of extraction electrodes is also reduced effectively: a power density of about 100 W/cm/sup 2/ has been obtained for a H/sup -/ ion current of 190 mA from an area of 13 cm/sup 2/ with 6 mmphi x 25 apertures (54 % transperency).

49080 **(IPPJ—791) Observations of the asymmetric power spectra of the density fluctuations in JIPP T-IIU plasma by the far-infrared laser scattering.** Nagatsu, M.; Nishida, I.; Ohnishi, H.; Tsukishima, T.; Okajima, S.; Mizuno, K.; Kawahata, K.; Tetsuka, T.; Fujita, J. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Sep 1986. 32p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87702937.

The asymmetric power spectra of the density fluctuations in JIPP T-IIU plasma are observed by far-infrared(FIR) laser scattering using a newly developed dual homodyne detection system. The observed spectra have many common features with those observed in PLT, TFR and others by microwave scattering. The peak frequencies of the broad spectra are found to be about three times as large as those of electron diamagnetic drift evaluated from the plasma parameters. The discrepancy can be mainly accounted for by the Doppler shift due to the fluid rotation of plasma by E vector x B vector drift. In addition, low frequency MHD activities are observed simultaneously for a low poloidal wavenumber.

49081 **(IPPJ-DT—129) Concept definition of an FRC/DD-/sup 3/He advanced fusion reactor.** Okamoto, M.; Momota, H.; Nomura, Y. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Aug 1986. 38p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. File Number DE87702939.

Posibilities of advanced fusion fuel cycle reactors are investigated. Characteristics of various D - D fusion fuel cycles are clarified and which magnetic confinement method can fit the most efficient advanced fuel cycle reactor is examined. A concept definition is considered for an advanced fusion reactor with DD - /sup 3/He fuel cycle in which the plasma is confined in a field-reversed configuration or field-reversed mirror. The concept definition is developed with emphasis on the feasibility of a steady-state self-ignited DD - /sup 3/He plasma with temperatures of 100 keV, the production method, the formation of ambipolar potential in the ambient plasma and the design of plasma energy direct convertor.

49082 **(IPPJ-DT—131) Data processing with PC-9801 micro-computer for HCN laser scattering experiments.** Iwasaki, T.; Okajima, S.; Kawahata, K.; Tetsuka, T.; Fujita, J. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Sep 1986. 170p. (In Japanese). NTIS (US Sales Only), PC A08/MF A01. File Number DE87702941.

In order to process the data of HCN laser scattering experiments, a micro-computer software has been developed and applied to the measurements of density fluctuations in the JIPP T-IIU tokamak plasma. The data processing system consists of a spectrum analyzer, SM-2100A Signal Analyzer (IWATSU ELECTRIC CO., LTD.), PC-9801m3 micro-computer, a CRT-display and a dot-printer. The output signals from the spectrum analyzer are A/D converted, and stored on a mini-floppy-disk equipped to the signal analyzer. The software to process the data is composed of system-programs and several user-programs. The real time data processing is carried out for every shot of plasma at 4 minutes interval by the micro-computer connected with the signal analyzer through a GP-IB interface. The time evolutions of the frequency spectrum of the density fluctuations are displayed on the CRT attached to the micro-computer and printed out on a printer-sheet. In the case of the data processing after experiments, the data stored on the floppy-disk of the signal analyzer are read out by using a floppy-disk unit attached to the micro-computer. After computation with the user-programs, the results, such as monitored signal, frequency spectra, wave number spectra and the time evolutions of the spectrum, are displayed and printed out. In this technical report, the system, the software and the directions for use are described.

49083 **(ITEF—153-1986) Numerical solution of the problem on the structure of cylindric Z-pinch with consideration of the terms connected with thermoforce.** Gerusov, A.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703290.

Numerical solution of the problem about cylindrically symmetric Z-pinch with consideration of the terms connected with thermoforce is realised. Detailed comparison with solution without new terms is carried out. It turns out that the terms connected with thermoforce are the most appreciably only in the skin layer. An approximate value of neon concentration at discharge in deuterium and neon mixture at maximum effect of new members on the discharge is determined. Calculations studying relative effect of different new members and calculations checking the necessity of realizing the conditions fro stability of calculations are also conducted. 2 refs.; 8 figs.

49084 **(ITEF—171-1985) Is neutron pinch formed in a plasma focus by a residual plasma? .** Sasorov, P.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1985. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703304.

It is discovered that a "residual" plasma outside current sheath in Z pinches initially having very low density affects considerably retarded stages of neck development. Probably, the whole pinch emitting neutrons (neutron pinch) consists in a residual plasma and is not shaped with skimmed current sheath as it was considered earlier. 9 refs.

49085 **(KFTI—86-12) Production of atom flows at materials evaporation by laser radiation.** Volkov, Ya.F.; Dyatlov, V.G.; Zelenin, G.V.; Kotsubanov, V.D.; Mitina, N.I.; Nikol'skij, I.K.; Pavlova, G.P. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703327.

Parameters of atom fluxes obtained by laser evaporation from the surface of a massive target are studied. Material of the target is Al and Ag. Total quantity of substance removed from the

surface of the target at the expense of laser radiation is measured by weighing. Energy distribution and quantity of evaporated atoms are determined by resonance radiation absorption. Duration of evaporation is identified by measured time characteristics of thermal radiation of the target surface. The head part of the flux comprising plasma is investigated by double probe and RF-signal absorption (λ3 cm). Optimum energy density of an evaporating pulse is shown to equal 3-4 J/cm² when using monopulse ruby laser of 3.5 J beam energy and duration of 30 ns. Quantity of evaporated substance in the flux at this energy density makes up $4x10^{16}$ and $2x10^{17}$ at. per pulse for Al and Ag respectively. At optimum energy density drops and plasma make up not more than 20 % from vapor mass. Here the energy of vapor atoms in the flux is equal to 2 eV and the head part of the flux moves at the velocity corresponding to energy of 130 eV. These requirements comply with requirements to the flux for simulation of natural inflow of impurities into plasma at the expense of sputtering and arc-formation. 13 references, 4 figures.

49086 **(KFTI—86-13) Effect of electrostatic field on behaviour of peripheric plasma at high-frequency heating.** Grigor'eva, L.L.; Smerdov, B.I.; Chechkin, V.V. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 20p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703328.

One of possible mechanisms resulting in increased separation of impurities under plasma HF heating in tokamaks and stellarators in the range of Alfven and ion cyclotron frequencies is studied. Potential guidence in limited plasma and development of particle currents in bound layers under the effect of external variable electrostatic field is considered. Consideration was carried out for two simplest models - plasma between two parallel electrodes and plasma filaments between two earthed electrodes in a longitudinal magnetic field (in the latter case experimentally). The results obtained permit to better understand polarization processes occuring under the effect of HF-electrostatic fields in complex systems. On the one hand these processes should result in removal of peripheral plasma particles on the wall of the chamber, limiters, aerial, and, on the other hand, in increased separation of impurities due to material sputtering of these details by ions accelerated in bound layers. 51 references, 5 figures.

49087 **(KFTI—86-30) Development of corpuscular-optical method for electric field measurement.** Ivanov, B.I.; Prichepov, V.P.; Kodyakov, V.M. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1986. 5p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703334.

A local contactless method based on simultaneous probing of an investigated object by a helium metastable atom (MA) beam in the state $2s^1S_0$ and by resonance radiation flux is suggested to study electromagnetic fields in high-temperature plasma and in charged particle beams. Optical pumping and MA collapse take place in the intersection point of the beam and the flux. The electrical field (E) influences pumping by Stark effect and results in alternation of the MA that passed through the flux volume and that promoted determination of E in the point of pumping. Bench-scale test of the method is carried out. Characteristic parameters of the method are determined based on the calculations and experiments. 4 references, 4 figures.

49088 **(LA-UR—87-2746) X-ray emission from high-Z spherical laser plasmas: Implications for plasma dynamics.** Goldstone, P.D.; Cobble, J.A.; Hauer, A.; Stradling, G.; Mead, W.C.; Goldman, S.R.; Coggeshall, S.; Richardson, M.C.; Jaanimagi, P.A.; Barnouin, O. (Los Alamos National Lab., NM (USA); Rochester Univ., NY (USA). Lab. for Laser Energetics). 1987. Contract W-7405-ENG-36. 18p. (CONF-8708110—9). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014722.

From 31. SPIE annual international technical symposium on optical and optoelectronic applied science and engineering; San Diego, CA, USA (16 Aug 1987).

Conversion of 351-nm laser light to soft x-rays has been studied using spherical gold targets irradiated at 5×10^{12} - 4×10^{15} W/cm². Spectra and time histories of sub-keV and M-band emission are presented. Results have been compared to detailed models (LASNEX) to better determine the dynamics of the plasma processes which lead to x-ray emission. 10 refs.

49089 **(LA-UR—87-2830) Helicity dissipation in the plasma edge.** Nebel, R.A. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 6p. (CONF-870908—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014762.

From Course and workshop on physics of mirrors, reversed field pinches and compact tori; Varenna, Italy (1 Sep 1987).

Three dimensional MHD simulations were done to test the conjecture that the cause of the increased loop voltage observed in certain RFP experiments is helicity dissipation in the highly resistive edge plasma region. The simulations were done with a 3-D nonlinear, 0-beta resistive MHD code. The Lundquist number for the simulations was $S = 10^4$. Resistivity was increased by a factor of 100 in the edge region. (WRF)

49090 **(ORNL/TM—10363) Feasibility of alpha particle measurement in a magnetically confined plasma by CO_2 laser Thomson scattering.** Richards, R.K.; Vander Sluis, K.L.; Hutchinson, D.P. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 28p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000039.

Fusion-product alpha particles will dominate the behavior of the next generation of ignited D-T fusion reactors. Advanced diagnostics will be required to characterize the energy deposition of these fast alpha particles in the magnetically confined plasma. For small-angle coherent Thomson scattering of a CO_2 laser beam from such a plasma, a resonance in the scattered power occurs near 90° with respect to the magnetic field direction. This spatial concentration permits a simplified detection of the scattered laser power from the plasma using a heterodyne system. The signal produced by the presence of fusion-product alpha particles in an ignited plasma is calculated to be well above the noise level, which results from statistical variations of the background signal produced by scattering from free electrons. 7 refs.

49091 **(OUP—87-13) Computer simulation of the electron decay in a neon afterglow plasma.** Mentzoni, M.; Holter, Oe. (Oslo Univ. (Norway). Fysisk Inst.). Apr 1987. 15p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752519.

The electron/ion decay in a neon afterglow plasma has been studied by computer simulation. The model includes electron removal by ambipolar diffusion and dissociative electron-ion recombination under partly non-isothermal conditions. Experimentally the decay falls within the outer bounds of the simulation decay. It was found that the decay is very sensitive to the electron temperature dependence of the recombination coefficient.

49092 **(PPPL—2429) Boxcar photography.** Greene, G.J.; Cutsogeorge, G.; Ono, M. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jul 1987. Contract AC02-76CH03073. 19p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000128.

A simple, inexpensive diagnostic has been developed for time-resolved imaging of repetitive self-luminescent phenomena. An electro-optic birefringent ceramic shutter is employed to perform photographic sampling and yields time resolution of 100 μsec. Methods of image enhancement in the presence of background light from a finite-contrast shutter are discussed. The system has been applied to the study of plasma evolution in the CDX device. 21 refs., 4 figs.

49093 **(PPPL—2440) Solitary Alfven wave envelopes and the modulational instability.** Kennel, C.F. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jun 1987. Contract AC02-76CH03073. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000127.

The derivative nonlinear Schroedinger equation describes the modulational instability of circularly polarized dispersive Alfven wave envelopes. It also may be used to determine the properties of finite amplitude localized stationary wave envelopes. Such envelope solitons exist only in conditions of modulational stability.

This leaves open the question of whether, and if so, how, the modulational instability produces envelope solitons. 12 refs.

49094 **(PPPL—2447) Application of polarized nuclei to fusion.** Kulsrud, R.M. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jul 1987. Contract AC02-76CH03073. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000125.

It is shown that the d-t fusion reaction can be modified by polarizing nuclear spins. The ways in which this improves reactor performance are mentioned and the feasibility of the process of spin polarization for magnetic fusion is discussed. 18 refs.

49095 **(PPPL—2449) Effect of deuteron temperature on iron forbidden line intensities in rf-heated tokamak plasmas.** Sato, K.; Suckewer, S.; Wouters, A. (Princeton Univ., NJ (USA). Plasma Physics Lab.). May 1987. Contract AC02-76CH0307¹. 40p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000124.

Two line ratios, the forbidden line at 845.5 A ($2s^22p\ ^2P$/sub 1/2/ - $2s^22p\ ^2P$/sub 3/2/) to the allowed line at 135.7 A ($2s^22p\ ^2P$/sub 1/2/ - $2s2p^2\ ^2D$/sub 3/2/) in Fe XXII and the forbidden line at 592.1 A ($2s^22p^4\ ^3P_2$ - $2s^22p^4\ ^1D_2$) to the forbidden line at 1118.2 A ($2s^22p^4\ ^3P_2$ - $2s^22p^4\ ^3P_1$) in Fe XIX, have been measured as the ion temperature-sensitive line ratios during rf heating in the Princeton Large Torus. The results indicate that deuteron collisions in plasmas of high deuteron temperature have a noticeable effect on the intensity of the forbidden lines. Measured relative intensities are compared with values from level population calculations, which include deuteron collisional excitation between the levels of the ground configuration. The agreement between the observed and calculated ratios is within 30%. A method for deuteron (or proton) temperature measurement in tokamak plasmas is discussed. 37 refs.

49096 **(PPPL—2450) MIRI: A multichannel far-infrared laser interferometer for electron density measurements on TFTR [Tokamak Fusion Test Reactor].** Mansfield, D.K.; Park, H.K.; Johnson, L.C.; Anderson, H.M.; Chouinard, R.; Foote, V.S.; Ma, C.H.; Clifton, B.J. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jul 1987. Contract AC02-76CH03073. 26p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000123.

A ten-channel far-infrared laser interferometer which is routinely used to measure the spatial and temporal behavior of the electron density profile on the TFTR tokamak is described and representative results are presented. This system has been designed for remote operation in the very hostile environment of a fusion reactor. The possible expansion of the system to include polarimetric measurements is briefly outlined. 13 refs., 8 figs.

49097 **(PPPL—2451) Diagonal Pade approximations for initial value problems.** Reusch, M.F.; Ratzan, L.; Pomphrey, N.; Park, W. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jun 1987. Contract AC02-76CH03073. 18p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000122.

Diagonal Pade approximations to the time evolution operator for initial value problems are applied in a novel way to the numerical solution of these problems by explicitly factoring the polynomials of the approximation. A remarkable gain over conventional methods in efficiency and accuracy of solution is obtained. 20 refs., 3 figs., 1 tab.

49098 **(PPPL—2452) Electron heating using lower hybrid waves in the PLT tokamak.** Bell, R.E.; Bernabei, S.; Cavallo, A.; Chu, T.K.; Luce, T.; Motley, R.; Ono, M.; Stevens, J.; von Goeler, S. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jun 1987. Contract AC02-76CH03073. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000121.

Lower hybrid waves with a narrow high velocity wave spectrum have been used to achieve high central electron temperatures in a tokamak plasma. Waves with a frequency of 2.45 GHz launched by a 16-waveguide grill at a power level less than 600 kW were used to increase the central electron temperature of the PLT plasma from 2.2 keV to 5 keV. The magnitude of the temperature increase depends strongly on the phase difference between the waveguides and on the direction of the launched wave. A reduction in the central electron thermal diffusivity is associated with the peaked electron temperature profiles of lower hybrid current-driven plasmas. 16 refs.

49099 **(PPPL—2457) Inverse problem for incremental synchrotron radiation.** Fisch, N.J. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jun 1987. Contract AC02-76CH03073. 9p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000117.

Significantly more information is available from synchrotron emission from a plasma when the plasma is purposefully disturbed. An inverse problem, to deduce properties of the disturbance given time-dependent radiation data, is proposed. The fast time response of radiation detectors is fully exploited by this approach. A special case of interest, perpendicular observation of a steady-state plasma, lends itself to an analytic inversion.

49100 **(PPPL—2459) Rigorous upper bounds for fluid and plasma transport due to passive advection.** Krommes, J.A.; Smith, R.A.; Kim, C.B. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jul 1987. Contract AC02-76CH03073. 10p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000116.

The formulation of variational principles for transport due to passive advection is described. A detailed account of the work has been published elsewhere. In the present paper, the motivations, philosophy, and implications of the method are briefly discussed. 15 refs.

49101 **(PPPL—2460) Parabolic approximation method for the mode conversion-tunneling equation.** Phillips, C.K.; Colestock, P.L.; Hwang, D.Q.; Swanson, D.G. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jul 1987. Contract AC02-76CH03073. 30p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000115.

The derivation of the wave equation which governs ICRF wave propagation, absorption, and mode conversion within the kinetic layer in tokamaks has been extended to include diffraction and focussing effects associated with the finite transverse dimensions of the incident wavefronts. The kinetic layer considered consists of a uniform density, uniform temperature slab model in which the equilibrium magnetic field is oriented in the z-direction and varies linearly in the x-direction. An equivalent dielectric tensor as well as a two-dimensional energy conservation equation are derived from the linearized Vlasov-Maxwell system of equations. The generalized form of the mode conversion-tunneling equation is then extracted from the Maxwell equations, using the parabolic approximation method in which transverse variations of the wave fields are assumed to be weak in comparison to the variations in the primary direction of propagation. Methods of solving the generalized wave equation are discussed. 16 refs.

49102 **(PPPL—2467) Differential form of the collision integral for a relativistic plasma.** Braams, B.J.; Karney, C.F.F. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Aug 1987. Contract AC02-76CH03073. 9p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000111.

A differential formulation for the Beliaev and Budker relativistic collision integral is presented. This permits the rapid numerical evaluation of the collision integral. The decomposition into spherical harmonics allows the collision operator to be expressed in terms of one-dimensional integrals for simple background distributions. This is useful in carrying out analytical work. It also provides a convenient method for calculating the boundary conditions for the potentials. 6 refs.

49103 **(SAND—87-1748) Analytic model of an imploding Z-pinch plasma colliding inelastically with a thin-shelled cylindrical target.** Hussey, T.W. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1987. Contract AC04-76DP00789. 31p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000051.

A simple model for the target dynamics of a distributed, uniform density imploding gas puff plasma colliding with a thin, annular, cylindrical shell has been developed. This model is applicable

to a pulse-power-driven, photoionization-pumped, recombination x-ray laser. By integrating the equation for momentum conservation it was possible to obtain target closure time, a quantity that may be compared to experiment. In addition, it was possible to find energy available as pump radiation as a function of target parameters. We find that this quantity is maximized when target mass approximately equals the gas mass times the thickness of the gas puff prior to stagnation divided by twice the target radius. We also find that this quantity is a relatively weak function of gas puff shell thickness prior to stagnation, a somewhat stronger function of target mass, and a very strong function of implosion velocity. 7 refs.

49104 **(UCLA/PPG—1092) Measurement of parallel ion energy distribution function in PISCES plasma.** Tynan, G.R.; Goebel, D.M.; Conn, R.W. (California Univ., Los Angeles (USA). Dept. of Mechanical, Aerospace and Nuclear Engineering). Aug 1987. Contract FG03-86ER52134. 44p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000108.

The PISCES facility is used to conduct controlled plasma-surface interaction experiments. Plasma parameters typical of those found in the edge plasmas of major fusion confinement experiments are produced. In this work, the energy distribution of the ion flux incident on a material surface is measured using a gridded energy analyzer in place of a material sample. The full width at half maximum energy distribution of the ion flux is found to vary from 10 eV to 30 eV both hydrogen and deuterium plasmas. Helium plasmas have a much lower FWHM energy spread than hydrogen and deuterium plasmas. The FWHM ion energy spread is found to be linearly related to the electron temperature. The most probable ion energy is found to be linearly related to the bias applied to the energy analyzer. Other plasma parameters have a weak influence upon the energy distribution of the ion flux. Two possible physical mechanisms for producing the observed results are introduced and suggestions for further work are made. The impact of the reported measurements on the materials experiments conducted in the PISCES facility are discussed and recommendations for future experiments are made. 11 refs., 13 figs.

49105 (UCRL—50025-87-1, pp 22-33) **Basic architecture and operation of the Personnel Safety and Interlocks System for MFTF-B.** Branum, J.D. Apr 1987. NTIS, PC A04/MF A01. File Number DE87009361.

In Electronics Engineering Department EE technical review.

A reliable and adaptable safety system was developed for the Mirror Fusion Test Facility-B (MFTF-B), experiment by employing two industrial-type programmable controllers to perform the majority of protective-interlock and hazard-monitoring functions. Self-diagnosing features were added to the controller systems that made the safety system essentially fail-safe even in the event of a hardware of software failure.

49106 **(UCRL—96898) Application of a two fluid theoretical plasma transport model on current tokamak reactor designs.** Ibrahim, E.; Fowler, T.K. (Lawrence Livermore National Lab., CA (USA)). Jun 1987. Contract W-7405-ENG-48. 7p. (CONF-870601—22). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013511.

From Annual meeting of the American Nuclear Society; Dallas, TX, USA (7 Jun 1987).

In this work, the new theoretical transport models to TIBER II design calculations are described and the results are compared with recent experimental data in large tokamaks (TFTR, JET). Tang's method is extended to a two-fluid model treating ions and electrons separately. This allows for different ion and electron temperatures, as in recent low-density experiments in TFTR, and in the TIBER II design itself. The discussion is divided into two parts: (1) Development of the theoretical transport model and (2) calibration against experiments and application to TIBER II.

49107 **Doppler splitting of electron cyclotron absorption resonance in plasmas.** Arunasalam, V.; Efthimion, P.C.; Hosea, J.C.; Hsuan, H.; Taylor, G. (Plasma Physics Laboratory, Princeton University, P.O. Box 451, Princeton, New Jersey 08544-0451). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3909-3911(15 Oct 1987).

The Gaussian broadening of absorption lines due to the Doppler effect is well known. However, it is shown here for the first time that Doppler splitting occurs for the ordinary-mode electron-cyclotron-resonance absorption in plasmas. Although this absorption is due to the finite size of the electron Larmor orbits it is mainly determined by T/sub X/ and is only weakly dependent on T/sub perpendicular/ via cyclotron-overstability-type terms. This is in contrast to intuitive expectations which would suggest that finite-Larmor-radius effects should depend strongly on T/sub perpendicular/.

49108 **Observation of an improved energy-confinement regime in neutral-beam—heated divertor discharges in the DIII-D tokamak.** Burrell, K.H.; Ejima, S.; Schissel, D.P.; Brooks, N.H.; Callis, R.W.; Carlstrom, T.N.; Colleraine, A.P.; DeBoo, J.C.; Fukumoto, H.; Groebner, R.J.; and others. (GA Technologies Inc., P.O. Box 85608, San Diego, California 92138). *Physical Review Letters;* **59**: No. 13, 1432-1435(28 Sep 1987).

Tokamak discharges using the expanded boundary divertor in the DIII-D device exhibit H-mode confinement. With neutral-beam power up to 6 MW, energy confinement remains comparable to the Ohmic value at a plasma current of 1 MA. Confinement is also independent of plasma density and toroidal field. Confinement increases with plasma current, but the exact functional dependence is, as yet, uncertain. These results show that the H mode can be achieved in a reactor-compatible open divertor configuration.

49109 **Anomalous electron heat transport driven by low frequency electromagnetic turbulence.** Thoul, A.A.; Similon, P.L.; Sudan, R.N. (Laboratory of Plasma Studies, Cornell University, Ithaca, New York 14853). *Physical Review Letters;* **59**: No. 13, 1448-1451(28 Sep 1987).

We consider the anomalous electron and heat transport in a tokamak plasma. The electrons are described by the nonlinear drift-kinetic equation. We analyze transport through the averaged response function in the presence of drift-Alfven wave turbulence. In contrast to recent findings by Terry, Diamond, and Hahm, we conclude that magnetic fluctuations lead to a substantial transport of both parallel and perpendicular energies. The latter, previously neglected, is found to be significant and of the order of the test-particle diffusion.

49110 **Ion microinstability at the outer sloshing-ion turning point of the tandem mirror experiment upgrade (TMX-U).** Berzins, L.V.; Casper, T.A. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physical Review Letters;* **59**: No. 13, 1428-1431(28 Sep 1987). Contract W-7405-ENG-48.

Since the start of TMX-U operations we have observed weak oscillations with a frequency approximately twice the ion-cyclotron frequency at the end-cell midplane. Recent results show that this instability is driven at the sloshing-ion outer turning point. We find that the sloshing-ion lifetime scales inversely with the instability amplitude. The sensitivity of this instability to the cold-ion density shows that this is a loss-cone instability. These results have important implications for mirror fusion experiments as well as solar and space plasmas.

49111 **Observation of a new toroidally localized kink mode and its role in reverse-field—pinch plasmas.** Tamano, T.; Bard, W.D.; Chu, C.; Kondoh, Y.; La Haye, R.J.; Lee, P.S.; Saito, M.; Schaffer, M.J.; Taylor, P.L. (GA Technologies, San Diego, California 92121). *Physical Review Letters;* **59**: No. 13, 1444-1447(28 Sep 1987).

A new type of toroidally localized kink instability, which we named the "slinky mode," was observed in a reversed-field—pinch plasma in the OHTE (Ohmic heating toroidal experiment) device. It is found that the slinky mode is the result of the phase locking of several internal kink modes due to nonlinear coupling and is an effective way to approach the Taylor relaxed state.

49112 **Turbulent relaxation of a confined magnetofluid to a force-free state.** Dahlburg, J.P.; Montgomery, D.; Doolen, G.D.; Turner, L. (Naval Research Lab., Washington, DC, USA; Dartmouth Coll., Hanover, NH, USA; Los Alamos National Lab., NM, USA). *Journal of Plasma Physics;* **37**: 299-321(Apr 1987).

Three-dimensional, pseudo-spectral computation is used to follow the evolution of a resistive, incompressible magnetofluid. The magnetofluid is confined by rigid, free-slip, perfectly-conducting square boundaries in the x, y directions ('poloidal' boundaries), and periodic boundary conditions are assumed in the z direction ('toroidal' direction). A constant, uniform d.c. magnetic field B/sub o/ is assumed in the z direction and a non-uniform current density j flows along it initially. Starting from a non-equilibrium hollow current profile, the evolution is followed for several tens of Alfven transit times. Considerable small-scale turbulence develops, which causes energy to decay more rapidly than magnetic helicity. The average toroidal magnetic field at the (x, y) boundary reverses sign spontaneously. The near spatial constancy of the ratio j.B/(jB) identical to cos theta, in the relaxed state at late times, suggests that the state is nearly force-free. However, the ratio $j.B/B^2$ identical to lambda is considerably less uniform than is cos theta, suggesting more residual disorder than a pure minimum-energy state would display.

49113 **X-ray multilayer optic development for plasma diagnostic and source enhancement.** Koppel, L.N.; Franco, E.D.; Penkethman, J.A.; Rodrigues, B. (Advanced Research and Applications Corp. (ARACOR), 1223 East Arques Avenue, Sunnyvale, CA 94086). pp 53-57 of X-ray imaging II. Knight, L.V.; Bowen, D.K. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-860880—).

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

The development of layered synthetic microstructure x-ray optic arrays to serve two distinct roles in high temperature plasma experimental research are described. An optic array of large active area (>500 cm/sup 2/) provides the basis for a fusion product-immune x-ray imaging system (XIS) diagnostic that is experimentally evaluated at the Princeton Plasma Physics Laboratory (PPPL) Tokamak Fusion Test Reactor (TFTR). The array is formed by end-to-end assembly of concave-cylindrical multilayer components along a parabolic trace. The experience to date in the physics and engineering design of the array is described.

49114 **Soft x-ray imaging system for measurement of non-circular tokamak plasmas.** Fonck, R.J.; Reusch, M.; Jaehnig, K.P.; Hulse, R.; Roney, P. (Princeton Univ. Plasma Physics Lab., Princeton, NJ 08544). pp 111-117 of X-ray imaging II. Knight, L.V.; Bowen, D.K. Bellingham, WA; SPIE Society of Photo-Optical Instrumentation Engineers (1986). (CONF-860880—).

From 30. SPIE technical symposium on optics and optoelectronic engineering; San Diego, CA, USA (17 Aug 1986).

A soft x-ray camera and image processing system has been constructed to provide measurements of the internal shape of high temperature tokamak plasmas. The camera consists of a metallic-foil-filtered pinhole aperture and a microchannel plate image intensifier/convertor which produces a visible image for detection by a CCD TV camera. A wide-angle tangential view of the toroidal plasma allows a single compact camera to view the entire plasma cross section. With Be filters 12 to 100 m thick, the signal from the microchannel plate is produced mostly by nickel L-line emissions which originate in the hot plasma core. The measured toroidal image is numerically inverted to produce a cross-sectional soft X-ray image of the plasma. Since the internal magnetic flux surfaces are usually isothermal and the nickel emissivity depends strongly on the local electron temperature, the X-ray emission contours reflect the shape of the magnetic surfaces in the plasma interior. Initial results from the PBX tokamak experiment show clear differences in internal plasma shapes for circular and bean-shaped discharges.

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REFER ALSO TO CITATION(S) 48120, 48120, 48121, 48121, 48136, 48721, 49056, 49081, 49081, 49088

49115 **(CONF-870188—1) Proposals for ORNL [Oak Ridge National Laboratory] support to Tiber LLNL [Lawrence Livermore National Laboratory].** Berry, L.A.; Rosenthal, M.W.; Saltmarsh, M.J.; Shannon, T.E.; Sheffield, J. (Oak Ridge National Lab., TN (USA)). 27 Jan 1987. Contract AC05-84OR21400. 99p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE87011657.

From Proposals for ORNL support to Tiber LLNL; Livermore, CA, USA (27 Jan 1987).

This document describes the interests and capabilities of Oak Ridge National Laboratory in their proposals to support the Lawrence Livermore National Laboratory (LLNL) Engineering Test Reactor (ETR) project. Five individual proposals are cataloged separately. (FI)

49116 (CONF-870188—1, pp 9, Paper 1) **Review of ORNL support for LLNL ETR effort.** Saltmarsh, M.J. (Oak Ridge National Lab., TN). 27 Jan 1987. NTIS, PC A05/MF A01. File Number DE87011657.

From Proposals for ORNL support to Tiber LLNL; Livermore, CA, USA (27 Jan 1987).

This proposal outlines the elements of a successful Engineering Test Reactor (ETR) effort and describes the proposed efforts by Oak Ridge National Laboratory (ORNL) in support of this research and development. The ORNL effort would involve physics, concepts, technology rsearch and development, and design. (FI)

49117 (CONF-870188—1, pp 17, Paper 2) **Proposal for ORNL physics support for Tiber.** Sheffield, J. (Oak Ridge National Lab., TN). 27 Jan 1987. NTIS, PC A05/MF A01. File Number DE87011657.

From Proposals for ORNL support to Tiber LLNL; Livermore, CA, USA (27 Jan 1987).

This proposal outlines the physics constraints and factors to be considered in the design of the Engineering Test Reactor (ETR). Also listed are the goals of Oak Ridge National Laboratory in addressing these areas. (FI)

49118 (CONF-870188—1, pp 14, Paper 3) **FEDC/ORNL role in ETR design.** Shannon, T.E. (Oak Ridge National Lab., TN). 27 Jan 1987. NTIS, PC A05/MF A01. File Number DE87011657.

From Proposals for ORNL support to Tiber LLNL; Livermore, CA, USA (27 Jan 1987).

This proposal describes the Fusion Engineering Design Center (FEDC)/Oak Ridge National Laboratory (ORNL) in Engineering Test Reactor design. Personnel and conceptual design capabilities are outlined, and the proposed support responsibility is discussed. (FI)

49119 (CONF-870188—1, pp 40, Paper 4) **Proposed ORNL development and technology engineering test reactor roles.** Berry, L.A. (Oak Ridge National Lab., TN). 27 Jan 1987. NTIS, PC A05/MF A01. File Number DE87011657.

From Proposals for ORNL support to Tiber LLNL; Livermore, CA, USA (27 Jan 1987).

This proposal discusses Oak Ridge National Laboratory's (ORNL) involvement and experience in the area of Fusion Technology. An outline of Engineering Test Reactor (ETR) tasks has been provided with statements as to the approach of ORNL intends in addressing these tasks.

49120 (CONF-870188—1, pp 13, Paper 5) **Background information and technical basis for assessment of environmental implications of magnetic fusion energy.** Cannon, J.B. (Oak Ridge National Lab., TN). 27 Jan 1987. NTIS, PC A05/MF A01. File Number DE87011657.

From Proposals for ORNL support to Tiber LLNL; Livermore, CA, USA (27 Jan 1987).

This proposal discusses the necessity of considering the environmental effects of the Engineering Test Reactor (ETR). A discussion of reliability, maintenance tasks, design of magnet coils, and remote handling is provided as a technical approach to minimizing any potential environmental hazard. (FI)

49121 **(CONF-8505191—Summ.) Report on the joint meeting of the Division of Development and Technology Plasma/Wall Interaction and High Heat Flux Materials and Components Task Groups.** Wilson, K.L. (ed.). (Sandia National Labs., Livermore, CA (USA)). Oct 1985. Contract AC04-76DR00789. 406p. NTIS, PC A18. File Number DE87013324.

From Joint meeting of the plasma/wall interactions and high heat flux materials and component task groups of the Division of Development and Technology; Washington, DC, USA (21 May 1985).

This report of the Joint Meeting of the Division of Development and Technology Plasma/Wall Interaction and High Heat Flux Materials and Components Task Groups contains contributing papers in the following areas: Plasma/Materials Interaction Program and Technical Assessment, High Heat Flux Materials and Components Program and Technical Assessment, Pumped Limiters, Ignition Devices, Program Planning Activities, Compact High Power Density Reactor Requirements, Steady State Tokamaks, and Tritium Plasma Experiments. All these areas involve the consideration of High Heat Flux on Materials and the Interaction of the Plasma with the First Wall. Many of the Test Facilities are described as well. (LSP)

49122 **(CONF-8707106—1) Interim report for Critical Issue E configuration and maintenance.** Spampinato, P.T. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 28p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014056.

From INTOR workshop; Vienna, Austria (13 Jul 1987).

Six activities have been under investigation for Critical Issue E during this phase of the INTOR Workshops. They deal with potential improvements to the tokamak configuration, changes to the maintenance and disassembly procedures, and the incorporation of design innovations. They are as follows: A comparative study of vertical and horizontal access configurations, the use of shape memory alloys, the use of ferromagnetic inserts for ripple reduction, poloidal field (PF) coil redundancy to reduce the size of the lower outboard coil, rapid replacement of divertor and first wall structures, and containment of tritium and activated dust. These topics are reviewed in this paper in the form of viewgraph presentation.

49123 **(DOE/DP/40200—33) Time-resolved absorption measurements on OMEGA.** Jaanimagi, P.A.; DaSilva, L.; Delettrez, J.; Gregory, G.G.; Richardson, M.C. (Rochester Univ., NY (USA). Lab. for Laser Energetics). 1986. Contract FC08-85DP40200. 16p. (CONF-8607116—2-Vugraphs). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014465.

From 16. annual anomalous absorption conference; Lake Luzerne, NY, USA (13 Jul 1986).

Time-resolved measurements of the incident laser light that is scattered and/or refracted from targets irradiated by the 24 uv-beam OMEGA laser at LLE, have provided some interesting features related to time-resolved absorption. The decrease in laser absorption characteristic of irradiating a target that implodes during the laser pulse has been observed. The increase in absorption expected as the critical density surface moves from a low to a high Z material in the target has also been noted. The detailed interpretation of these results is made through comparisons with simulation using the code LILAC, as well as with streak data from time-resolved x-ray imaging and spectroscopy. In addition, time and space-resolved imaging of the scattered light yields information on laser irradiation uniformity conditions on the target. The report consists of viewgraphs.

49124 **(DOE/DP/40200—34) Time-resolved ablation measurements of imploding targets.** DaSilva, L.; Delettrez, J.; Epstein, R.; Gregory, G.G.; Jaanimagi, P.A.; Richardson, M.C. (Rochester Univ., NY (USA). Lab. for Laser Energetics). 1986. Contract FC08-85DP40200. 12p. (CONF-8607116—3-Vugraphs). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014464.

From 16. annual anomalous absorption conference; Lake Luzerne, NY, USA (13 Jul 1986).

Time-resolved x-ray spectroscopy of multi-layer shell targets irradiated by the 24 uv-beam OMEGA laser at LLE has been used to infer the mass ablation rate during the implosion. The x-ray emission from Al and Mg signature layers imbedded in 10 microns of CH was recorded with an x-ray streak camera coupled to an elliptical crystal spectrometer. The radial position at the time of burn-through was measured directly using time-resolved x-ray imaging. The mass ablation rate calculated by this method, although confirming previous experimental measurements, continues to exceed that predicted by the hydrocode LILAC run with a flux limiter of 0.06. Furthermore, the time evolution of the Al and Mg emission indicate a characteristic rise-time longer than that observed in non-LTE simulations. One possible explanation of these discrepancies is beam nonuniformities, the effects of which are discussed. The report consists of viewgraphs.

49125 **(DOE/DP/40200—39) Enhanced Thomson scattering from laser plasmas.** Batha, S.H.; Seka, W.; Goldman, L.M.; Simon, A.; Short, R.W.; Bahr, R.; Lockman, W. (Rochester Univ., NY (USA). Lab. for Laser Energetics). 1986. Contract FC08-85DP40200. 13p. (CONF-861110—8). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014463.

From American Physical Society Plasma Physics Division meeting; Baltimore, MD, USA (3 Nov 1986).

Carried out is a preliminary series of experiments to investigate the origin of broad band features in the scattered light spectrum of laser-produced plasmas. Results are consistent with the Thomson Scattering model enhanced by the presence of a non-thermal electron distribution as opposed to the usual convective stimulated Raman scattering model.

49126 **(DOE/DP/40200—41) Time-resolved temperature and density measurements in ionizing, uniformly irradiated uv-laser-produced plasmas.** Marjoribanks, R.; Audebert, P.; DaSilva, L.; Delettrez, J.; Epstein, R.; Gregory, G.; Jaanimagi, P.; Richardson, M. (Rochester Univ., NY (USA). Lab. for Laser Energetics). 1986. Contract FC08-85DP40200. 14p. (CONF-861110—9-Vugraphs). NTIS MF A01; 2; GPO Dep. File Number DE87014649.

From American Physical Society Plasma Physics Division meeting; Baltimore, MD, USA (3 Nov 1986).

The purpose of these experiments is to produce a well-defined measurement of local temperature and density in an x-ray emitting region of a uniformly irradiated uv-laser-produced plasma. Results are given the viewgraphs that make up the report.

49127 **(DOE/DP/40200—47-Vol.31) LLE [Laboratory for Laser Energetics] review, Volume 31: Quarterly report, April-June 1987.** Donaldson, W. (ed.). (Rochester Univ., NY (USA). Lab. for Laser Energetics). 1987. Contract FC08-85DP40200. 60p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87013732.

This volume of the LLE Review, covering the period April-June 1987, contains a summary of the recent high-density campaign on the OMEGA laser system; a report on the absorption and radiation of energy from spherically irradiated targets; and a computer model describing the source of hot spots in the OMEGA laser. The section on advanced technology has reports on a method for accurately measuring the phase of a high-power laser and the development of an extremely bright and compact laser. Finally the activities of the National Laser Users Facility and the GDL and OMEGA laser facilities are summarized. The highlights of this issue are: the high-density campaign using gas-filled targets on the OMEGA laser system resulted in fuel compressions of 50 times liquid DT density; measurements on spherically irradiated targets have demonstrated that the one-dimensional hydrodynamic code

LILAC can accurately predict the absorption of ultraviolet radiation and the subsequent production of x rays; the source of hot spots in the target-plane intensity profile of the OMEGA ultraviolet beams has been identified. Small aberrations in the infrared phase profile cause the third-harmonic light to fragment into several small beamlets in the target plane; a method has been developed to accurately measure the phase of a high-power laser beam. Variations as small as $\lambda/50$ can be measured, making it possible to identify source of the hot spots in the OMEGA laser beam; an extremely bright and compact laser has been developed. This laser, which fits on a tabletop, has achieved 0.5 J in 1.0 ps and can attain a brightness of 4×10^{16} W/cm^2 $\Delta\Omega$ when focused with an f/1 lens; and a cryogenic target positioner was installed and activated on the OMEGA target chamber. The first in a series of shots was taken to achieve high-density implosions of cryogenic targets.

49128 **(DOE/ET/51013—214) High field, low current operation of engineering test reactors.** Schwartz, J.; Cohn, D.R.; Bromberg, L.; Williams, J.E.C. (Massachusetts Inst. of Tech., Cambridge (USA). Plasma Fusion Center). Jun 1987. Contract AC02-78ET51013. 12p. (CONF-871007—1; PFC/CP—87-2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013942.

From Symposium on fusion engineering; Monterey, CA, USA (12 Oct 1987).

Steady state engineering test reactors with high field, low current operation are investigated and compared to high current, lower field concepts. Illustrative high field ETR parameters are R = 3 m, $\alpha \sim 0.5$ m, B $\sim$ 10 T, $\beta = 2.2\%$ and I = 4 MA. For similar wall loading the fusion power of an illustrative high field, low current concept could be about 50% that of a lower field device like TIBER II. This reduction could lead to a 50% decrease in tritium consumption, resulting in a substantial decrease in operating cost. Furthermore, high field operation could lead to substantially reduced current drive requirements and cost. A reduction in current drive source power on the order of 40 to 50 MW may be attainable relative to a lower field, high current design like TIBER II implying a possible cost savings on the order of $200 M. If current drive is less efficient than assumed, the savings could be even greater. Through larger β/sub p/ and aspect ratio, greater prospects for bootstrap current operation also exist. Further savings would be obtained from the reduced size of the first wall/blanket/shield system. The effects of high fields on magnet costs are very dependent on technological assumptions. Further improvements in the future may lie with advances in superconducting and structural materials.

49129 **(EUR—10422) Mixing and mass transfer in bubble extractor: its application to tritium extraction from 17Li83Pb.** Baratti, R.; Polcaro, A.M.; Ricci, P.F.; Viola, A.; Pierini, G. (Commission of the European Communities, Ispra (Italy). Joint Research Centre; Commission of the European Communities, Luxembourg). 1986. 31p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752560.

The tritium extraction from the liquid alloy 17Li83Pb has been examined taking into consideration the equations related to the design of bubble extractors in order to verify which are the highest tritium recovery efficiencies which can be realized so as to minimize the tritium permeation into the water of the cooling system. For the tritium desorption from alloy, flowing countercurrent to a helium stream in a bubble extractor, the axial dispersion in liquid and gaseous phase and the effect of gas phase expansion caused by reduced hydrostatic head in the extractor are taken into account. Taking into consideration some NET technical specifications, such as the alloy volume in the blanket of 65 m/sup 3/ and the tritium generation rate of 78 g.d/sup -1/, the results are presented and discussed.

49130 **(EUR-CEA-FC—1311) Mode attenuation in overdimensioned circular waveguides for millimeter and submillimeter waves - comparison of principal modes in different types of guides.** Crenn, J.P. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Dept. de Recherches sur la Fusion Controlee). Nov 1986. 73p. (In French). NTIS (US Sales Only), PC A04/MF A01. File Number DE87752595.

Theoretical results on different waveguide types are gathered, possible improvements are studied, different models are compared. In the same time, comparing solutions in millimeter and submillimeter fields make possible the joint between these two fields for which, up to now, different solutions have been brought. The study is essentially aimed at attenuation in waveguides. It is necessary to use overdimensioned guides (that is to say having transverse dimensions greater than the wavelength) to lower sufficiently the attenuation. Simultaneous propagation of several modes is consequently possible in the guide. In limiting us to overdimensioned guides, mode attenuation is compared in metal circular guides, circular guides with dielectric or weakling conducting walls, and circular guides with more complex structures, together with corrugated metal and metal dielectric composite wall guides.

49131 **(HEDL-SA—3379) Low activation ferritic alloys for nuclear fusion reactors.** Gelles, D.S. (Hanford Engineering Development Lab., Richland, WA (USA)). Jan 1987. Contract AC06-76FF02170. 21p. (CONF-870272—7-Vugraphs). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87010711.

From American Institute of Metallurgical Engineers annual meeting: light metals session; Denver, CO, USA (22 Feb 1987).

The fusion power reactor concept has an inherent advantage over fission reactor designs; the radioactivity of the fuel decays rapidly with time. However, this inherent advantage will be lost unless reactor structural materials can be employed which have similar advantages. Elemental additions of Nb, Mo, Ni, and N have half lives which will lead to high levels of radioactivity even after 100 years of storage. Therefore, the Office of Fusion Energy, DOE has funded development of low activation alloys, i.e., alloys with very limited additions of Nb, Mo, Ni and N. This paper describes the design and testing of one series of alloys from one of the classes of materials being studied. The alloys are bainitic or martensitic stainless steels which have tungsten and/or vanadium substituted for molybdenum. Alloy selection criterion, production and testing will be described including microstructural examination and mechanical properties testing following irradiation by fast neutrons in a liquid metal cooled fast breeder reactor. The results demonstrate that martensitic stainless steels in the Fe-9 to 12 Cr range appear most promising for fusion structural materials applications.

49132 **(HEDL-SA—3476) Some safety considerations of liquid lithium as a fusion breeder material.** Jeppson, D.W.; Muhlestein, L.D. (Hanford Engineering Development Lab., Richland, WA (USA)). Jan 1986. Contract AC06-76FF02170. 5p. (CONF-860652—34). NTIS, PC A02. File Number DE87014372.

From 7. topical meeting on the technology of fusion energy; Reno, NV, USA (15 Jun 1986).

Test results and conclusions are presented for the reaction of steam with a high temperature lithium pool and for the reaction of high temperature lithium spray with a nitrogen atmosphere. The reactions are characterized and evaluated in regard to the potential for mobilization of radioactive species associated with the liquid breeder under postulated fusion reactor accident conditions. These evaluations include measured lithium temperature responses, atmosphere temperature and pressure responses, gas consumption and generation, aerosol quantities and particle size characterization, and potentially radioactive species releases. Conclusions are made as to the consequences of these safety considerations for the use of lithium as a fusion reactor breeder material.

49133 **(IPPJ—775) ICRF current drive experiment on JIPP T-IIU.** Ando, R.; Kako, E.; Ogawa, Y.; Watari, T. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Apr 1986. 22p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87702933.

In JIPP T-IIU tokamak the fast wave current drive by five loop antennas has been successfully carried out with a relatively high density plasma (ω/sub pe//sup 2//ω/sub ce//sup 2/ — 5). The RF frequency is 40 MHz and the toroidal field is 2 kG, which corresponds to $\omega = 13\omega$/sub cH/. To exclude the effect of the inductive field, the plasma production and the start-up of the plasma current have been done with ICRF wave only. The density and temperature of a plasma produced by the RF wave are that n-bar/

sub e/ — 2 x 10/sup 18/ m/sup -3/ and T/sub e/ — 10 eV, where only the fast wave can propagate excluding out the possibility of a slow wave current drive. This density is two orders of magnitude higher than the density limit predicted for the slow wave current drive. The maximum plasma current of 3.5 kA is driven with the rf power of about 400 kW. The efficiency eta = I/sub P/n-bar/sub e/ R/P/sub rf/ is around 2 x 10/sup 16/ A center dot m/sup -2//W, which is two orders of magnitude lower than that of recent lower hybrid current drive. A large MHD oscillation is observed and the electron temperature is limited around 10 eV, although the safety factor q/sub a/ is about 10 or more. The relatively low current drive efficiency observed will be attributed to the low electron temperature. We have observed the clear dependence of the current drive efficiency as a function of the phase difference Δphi. When antennas are phased with Δphi = $\pi/4$, the maximum efficiency is obtained. A calculation shows that the wave spectrum is then peaked around N sub(parallel) — 4.

49134 (IPPJ-DT—126) Low power level control unit of high power amplifiers for ICRF heating experiment in JIPP T-IIU tokamak. Kako, E.; Aoki, T.; Watari, T. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Mar 1986. 18p. (In Japanese). NTIS (US Sales Only), PC A02/MF A01. File Number DE87702938.

A low power level control unit for high power amplifiers was made on an trial basis and employed successfully in ICRF heating experiment on JIPP T-IIU tokamak. This unit has four operating modes; (1) short pulse mode for tuning of high power amplifiers, (2) aging mode for aging of ICRF antennas, (3) long pulse mode for a manual operation and (4) experimental mode which is synchronized to tokamak discharges. An rf pulse signal is modulated by this unit for each mode. Moreover, this unit is interlocked with status signals, reflected rf power from a load and plasma current. This low power level control unit can be used in a frequency range of 10 MHz - 100 MHz.

49135 (LA-UR—87-2875) A tapered poloidal gap for the reduction of field errors. Moses, R.W. (Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 7p. (CONF-8707105—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014750.

From Reversed field pinch workshop; Los Alamos, NM, USA (13 Jul 1987).

The conventional Reversed Field Pinch is surrounded by a toroidal conducting shell that provides wall stabilization for the plasma. Usually, this shell is made of aluminum or copper, and it must have an insulated poloidal gap to permit penetrations of toroidal loop voltage to the plasma. Many magnetic field perturbations will induce toroidal shell currents with poloidal Fourier components having mode numbers m ≧1. A butt-joint poloidal gap will mode convert all of these image currents into potentially damaging magnetic-field errors with large spectra of toroidal-mode numbers. Overlapping tapered gaps have been proposed and partially tested for reducing these field errors. The mathematical basis for minimizing the m = 1, n = 0 field errors for all frequencies using tapered gaps, is presented in this paper.

49136 (NIIEFA-P-B—0697) Some results of parametric analysis of plasma current disruption effects in a reactor-tokamak. Astapkovich, A.M.; Sadakov, S.N. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1985. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703341.

Intensive reconstruction of poloidal magnetic field in tokamak reactor blanket area takes place in the plasma current disruption mode and electrodynamic loads on the blanket structures reach their extreme values. Bound loop approach is applied for analysis of transitional electromagnetic processes, occuring in tokamak reactor azimuth-sectioned blanket under plasma current disruption. Parametric dependence of eddy current maximum values, electric voltage between the blanket sectors and the main electrodynamic loads on the active resistance of bellows and blanket sector inside walls and on the typical time of plasma current decay, is presented. 7 references, 8 figures, 2 tables.

49137 (ORNL/FEDC—86/5) System studies of compact ignition tokamaks. Galambos, J.D.; Blackfield, D.T.; Peng, Y.K.M.; Reid, R.L.; Strickler, D.J.; Selcow, E. (Oak Ridge National Lab., TN (USA). Fusion Engineering Design Center). Aug 1987. Contract AC05-84OR21400. 75p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014976.

The new Tokamak Systems Code, used to investigate Compact Ignition Tokamaks (CITs), can simultaneously vary many parameters, satisfy many constraints, and minimize or maximize a figure of merit. It is useful in comparing different CIT design configurations over wide regions of parameter space and determining a desired design point for more detailed physics and engineering analysis, as well as for performing sensitivity studies for physics or engineering issues. Operational windows in major radius (R) and toroidal field (B) space for fixed ignition margin are calculated for the Ignifed and Inconel candidate CITs. The minimum R bounds are predominantly physics limited, and the maximum R portions of the windows are engineering limited. For a modified Kaye-Goldston plasma-energy-confinement scaling, the minimum size is 1.15 m for the Ignifed device and 1.25 m for the Inconel device. With the Ignition Technical Oversight Committee (ITOC) physics guidance of B^2a/q and I/sub p/ >10 MA, the Ignifed and Base-line Inconel devices have a minimum size of 1.2 and 1.25 m and a toroidal field of 11 and 10.4 T, respectively. Sensitivity studies show Ignifed to be more sensitive to coil temperature changes than the Inconel device, whereas the Inconel device is more sensitive to stress perturbations.

49138 (ORNL/TM—10365) Relative merits of size, field, and current on ignited tokamak performance: A comparison of "CITs" and "Super-JETs". Uckan, N.A. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 36p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000038.

A simple global analysis is used to examine the relative merits of size (L = a or R_o), field (B_o), and current (I) on ignition regimes of tokamaks under various confinement scaling laws. Scalings of key parameters (n tau/sub E/, β, P/sub aux/, P/sub fus/, etc.) with L, B_o, and I are presented at several operating points, including: (1) optimal path to ignition (saddle point); (2) ignition at minimum beta; (3) ignition at 10 keV; and (4) maximum performance at the limits of density (n/sub max/ ~ B_o/R_o) and beta (β/sub crit/ ~ I/aB_o). Expressions for the saddle point and the minimum conditions needed for Ohmic ignition are derived analytically for any confinement model of the form tau/sub E/ ~ n/sup x/T/sup y/. For a wide range of confinement models, the "figure of merit" parameters aB_o^2/q^* ~ $IB_o(R_o/a)$ and I are found to give a good indication of the relative performance of the devices, where q^* is the cylindrical safety factor. As an illustration, the results are applied to "CITs" (a class of compact, high-field ignition tokamaks) and "Super-JETs" [a class of large-size (few x JET), low-field, high-current (20-MA) devices]. 22 refs.

49139 (ORNL/TM—10464) Planning for US ion cyclotron heating research relevant to the Compact Ignition Tokamak and Alcator C-Mod. Swain, D.W.; Yugo, J.J. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 74p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE88000022.

Ion cyclotron heating (ICH) has been chosen as the primary method for providing auxiliary heating power to the plasma in the Compact Ignition Tokamak (CIT). Sustained progress in ion cyclotron range of frequencies (ICRF) heating experiments, together with supporting technology development, continues to justify selection of this technique as the preferred one for heating CIT to ignition. However, the CIT requirements are sufficiently different from existing achievements that continued experimentation and development are needed to meet the goals of the CIT experiment with a high degree of reliability. The purpose of this report is fourfold: (1) to review briefly the physics and technology research and development (R & D) needs for ICH on CIT, (2) to review the status of and planned programs for ICH on US and international machines, (3) to propose a unified "mainline" R & D program specifically geared to testing components for CIT, and (4) to assess the needs for experiments including C-Mod, the Tokamak Fusion Test Reac-

tor (TFTR), and DIII-D to provide earlier information and improved probability of success for CIT ICH. 4 refs., 4 figs., 5 tabs.

49140 **(ORNL/TM—10482) Progress in stellarator/heliotron research, 1981-1986: Executive summary.** Carreras, B.A.; Grieger, G.; Harris, J.H.; Johnson, J.L.; Lyon, J.F.; Motojima, O.; Rau, F.; Renner, H.; Rome, J.A.; Uo, K. (Oak Ridge National Lab., TN (USA)). Sep 1987. Contract AC05-84OR21400. 22p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000017.

Substantial progress in plasma parameters, physics understanding, and stellarators/heliotron concept improvement has been made in the five years since a previous assessment of the field. This includes substantial achievements in higher plasma parameters and currentless plasma operation; new theoretical results with respect to higher beta limits, second stability region, effect of a helical axis, effect of electric fields on transport, and reduction of secondary currents; and improvements to the reactor concept. The key issues have been further refined, and the short-term direction of the program is clear; a number of new facilities that were designed to resolve these issues are about to come into operation or are in the final design stages. Details of the design of the next-generation experiments will follow from the results of the near-term experiments.

49141 **(PPPL—2446) Polarized advanced fuel reactors.** Kulsrud, R.M. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Jul 1987. Contract AC02-76CH03073. 14p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000126.

The d-^{3}He reaction has the same spin dependence as the d-t reaction. It produces no neutrons, so that if the d-d reactivity could be reduced, it would lead to a neutron-lean reactor. The current understanding of the possible suppression of the d-d reactivity by spin polarization is discussed. The question as to whether a suppression is possible is still unresolved. Other advanced fuel reactions are briefly discussed. 11 refs.

49142 **(PPPL—2465) The spheromak as a prototype for ultra-high-field superconducting magnets.** Furth, H.P.; Jardin, S.C. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Aug 1987. Contract AC02-76CH03073. 12p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE88000112.

In view of current progress in the development of superconductor materials, the ultimate high-field limit of superconducting magnets is likely to be set by mechanical stress problems. Maximum field strength should be attainable by means of approximately force-free magnet windings having favorable "MHD" stability properties (so that small winding errors will not grow). Since a low-beta finite-flux-hole spheromak configuration qualifies as a suitable prototype, the theoretical and experimental spheromak research effort of the past decade has served to create a substantial technical basis for the design of ultra-high-field superconducting coils. 11 refs.

49143 **15-cm hybrid ion diode on PBFA-I.** Mendel C.W. Jr.; Quintenz, J.P.; Mix, L.P.; Zagar, D.M.; Noack, R.L.; Grasser, T.; Webb, J.A. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Journal of Applied Physics;* **62**: No. 9, 3522-3534(1 Nov 1987).

Diode experiments on the PBFA-I pulser using a magnetically insulated ion diode are described. The insulating magnetic field is supplied by self-field due to the ion current plus the field generated by a series field coil. In the experiments described here, the diode operated at the 10-TW, 2.5-MV level with over 300 kJ going to the diode on many shots. The operation of the diode, the dielectric anode, and the proton beam focusing are described.

49144 **Fabrication of polyvinyl alcohol coated polystyrene shells.** Burnham, A.K.; Grens, J.Z.; Lilley, E.M. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Journal of Vacuum Science and Technology, A: Vacuum, Surfaces, and Films;* **5**: No. 6, 3417-3421(Nov 1987). Contract W-7405-ENG-48.

Glass shells have been used traditionally as the deuterium—tritium fuel container for direct-drive laser fusion experiments because of their convenience and availability, but lower-Z fuel containers have superior implosion characteristics and diagnostic possibilities. Unfortunately, polymers such as polystyrene (PS) that produce shells easily have very high permeabilities so require cryogenics to retain fuel, and impermeable polymers such as polyvinyl alcohol (PVA) are difficult to make into high-quality shells. We have developed improved methods of making PS shells with diameters from 0.2 to 0.7 mm and coating them with a 3-μm layer of PVA to obtain the advantages of both. Both the PS shells and the PVA coating are made in drop towers using gas-stripped nozzles. Details of the procedures and product quality are discussed.

49145 **Effect of laser illumination nonuniformity on the analysis of time-resolved x-ray measurements in uv spherical transport experiments.** Delettrez, J.; Epstein, R.; Richardson, M.C.; Jaanimagi, P.A.; Henke, B.L. (Laboratory for Laser Energetics, University of Rochester, 250 East River Road, Rochester, New York 14623-1299). *Physical Review [Section] A: General Physics;* **36**: No. 8, 3926-3934(15 Oct 1987).

In this paper we present measurements of thermal transport in spherical geometry made with 24 uv (351-nm) beams from the OMEGA laser system of the Laboratory for Laser Energetics of the University of Rochester. The measurements, using time-resolved x-ray spectroscopy on solid glass targets coated with varying thicknesses of plastic, provide absolute measurements of the onset times of the resonance x-ray lines of silicon. From these measurements, the scaling of the instantaneous mass-ablation rate with absorbed intensity is obtained for times before and after the peak of the laser pulse. The observed large burnthrough depths and early onsets of the x-ray lines are explained by carrying out detailed hydrodynamic-code simulations for the range of the estimated laser-intensity distribution on target which is obtained from the superposition of the equivalent target-plane intensity distribution of a single beam. We find that neglecting the effects of laser illumination nonuniformities can lead to erroneous conclusions about the heat transport. We conclude from the analysis that the experimental results can be explained by the presence of significant energy at intensities three times the nominal intensity, contained in hot spots of size less than 20 μm. This is almost twice as much as the maximum intensity obtained from the superposition of the single-beam distribution.

49146 **Process and system for detecting and measuring a tritium gas leak.** Thurlow, N.C.; Hruda, R.M. (to Westinghouse Electric Corp., Pittsburgh, PA). US Patent 4,683,749. 4 Aug 1987. Filed date 22 May 1986. vp. Patent and Trademark Office, Box 9, Washington, DC 20232.

This patent describes a method for detecting and measuring a tritium gas leak from a sealed container comprising, disposing a sealed container of tritium gas in a chamber, collecting and concentrating a sample of gas from the chamber in a reservoir and passing the sample into at least one radiation detector.

49147 **Tokamak fusion reactor start-up simulation.** Ling, K.M.; Jardin, S.C.; Perkins, F.W. (Los Alamos National Lab., Los Alamos, NM 87545). *Fusion Technology;* **12**: No. 1, 22-29(Jul 1987). Contract AC02-76CH03073.

The simulation code TSEC (time-dependent spectral equilibrium code) has been developed to model the axisymmetric evolution of a tokamak on the resistive (L/R) time scale of the external coils, conductors, or shell. The electromagnetic interaction between the plasma and the external circuit is taken into account in a self-consistent manner. The Lagrangian TSEC utilizes magnetic flux coordinates with spectral decomposition in the angle variable θ. The plasma is modeled as a finite-size, zero-inertia, finite-pressure fluid, which adjusts its position and shape to remain in free-boundary equilibrium, consistent with the currents in the external circuits. At the heart of TSEC is a fast method of calculating the self-consistent free-boundary plasma equilibrium at each time step, which is based on the minimization of a certain mean-square error.

49148 **A fusion reactor for space applications.** Kammash, T.; Galbraith, D.L. (Univ. of Michigan, Dept. of Nuclear Engineering, Ann Arbor, MI 48109). *Fusion Technology;* **12**: No. 1, 11-21(Jul 1987).

A novel approach to fusion power that combines the favorable aspects of magnetic and inertial confinements has recently been proposed in the "magnetically insulated inertial confinement fusion" (MICF) reactor. In contrast to conventional inertial confinement

schemes, this approach relies on generating the needed plasma inside of a spherical shell by zapping the inside surface of a hollow pellet with an intense laser beam. Physical confinement is provided by the metallic shell that surrounds the deuterium-tritium fuel-coated inner surface, while very strong, plasma-generated magnetic fields provide the desired thermal insulation of the plasma from the surrounding surface. Because of these unique properties, the inertial confinement time can be increased by about two orders of magnitude relative to that of conventional inertial confinement schemes, with the result that truly impressive energy multiplication factors can result. Carbon dioxide lasers of hundreds of kilojoules may be readily employed for such reactors, and, since they are relatively efficient and can be chemically driven, these systems lend themselves nicely to such space applications as space-based power sources or rocket propulsion.

49149 **A macroscopic study of the neutron, gamma- and X-ray emissivity in the Frascati plasma focus.** Brzosko, J.S.; Robouch, B.V.; Klobukowska, J. (Stevens Institute of Technology, Hoboken, NJ 07030). *Fusion Technology;* **12**: No. 1, 71-91(Jul 1987).

Experiments were carried out in the neutron-optimized mode of the plasma focus operation with small electrode diameters and condenser bank energies of 250, 390, and 490 kJ. The time sequence of the emitted radiation (neutron and gamma) was realized by the time-of-flight (TOF) method using an NE-102A plastic scintillator and silicon detectors viewing X rays from the plasma exclusively. The detectors were operated in the wide-energy window mode. Special attention was given to the interpretation of neutron TOF traces and their comparison with the absorption analysis and previously measured spectra by nuclear plates. Average values are discussed simultaneously with the results of representative single shots. It was found that two (something more) neutron bursts are typical and, in each case, are accompanied by simultaneous hard X rays. The maxima of emissivities coincide with the dI/dt maximum. A theoretical analysis of the results reveals the existence of long time-confined streams of fast electrons and deuterons (effective-energy — 80keV) with evidence of their slowing down.

99 GENERAL AND MISCELLANEOUS

49150 **(CONF-870649—2) Definitions as database records.** Strehlow, R.A. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 20p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014057.

From American Society for Testing and Materials; Cincinnati, OH, USA (21 Jun 1987).

New information technology is being applied to the task of terminology management in ASTM. We visualize an enhancement of product quality, a facility to increase the scope of terminology work, an increased selection of products, and the potential for becoming more appropriately involved in international standardization efforts. Considering the feasibility and costs for the options that are just now becoming evident will provide an exciting technical challenge for some time into the future. Choice of direction will be determined in part by results of the competition for resources that are always too limited. However, the possible rewards are great.

49151 **(DOE/ER—0184/3) Guide for the preparation of applications for the University Research Instrumentation program, 1988.** (USDOE Office of Energy Research, Washington, DC. University and Industry Programs Div.). [1987]. 36p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000231.

The US Department of Energy, Division of University and Industry Programs, Office of Energy Research, invites the submission of applications for its University Research Instrumentation program. This program is intended to help strengthen the ability of universities and colleges to conduct long-range, energy-related research by assisting them in acquiring some of the specialized research instrumentation which is required. All areas of energy research will be eligible. However, in FY 1988 the funds will be used principally to support instrumentation required for advanced research in five major areas: Biological Energy Conversion, Biomedical and Environmental Research, Energy Resource Geoscience Research, Nuclear Physics, and Photochemical Energy Conversion.

49152 **(DOE/MA—0297-2) Quarterly status of Department of Energy projects.** (USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Project and Facilities Management). 30 Jun 1987. 484p. NTIS, PC A21/MF A01; 1; GPO Dep. File Number DE88000280.

This report presents cost and schedule information for all projects in the design or construction phase. The first section in the package is a Summary Report which functions as an index to the detailed Project Report. The Summary Report is followed by a series of variance reports including a Total Estimated Cost (TEC) Report, a Total Project Cost (TPC) Report, and a Schedule Construction or Fabrication Complete Varience Report. The final section is a detailed Project Report which addresses each individual project.

49153 **(DOE/MA—0311) Report to Congress on the Small Business Program of the Department of Energy, FY 1986.** (USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Small and Disadvantaged Business Utilization). Aug 1987. 51p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014996.

The Department of Energy's (DOE) total Fiscal Year 1986 small business achievement was $2.685 billion in prime subcontracts to small businesses. This figure includes awards to disadvantaged and women-owned businesses which are subcategories of small business.

49154 **(ORNL/TM—10495) PCB [polychlorinated biphenyls] annual report for Oak Ridge National Laboratory, 1986.** Barkenbus, B.D.; Puett, T.T.; Sigmon, C.F. (Oak Ridge National Lab., TN (USA)). Jul 1987. Contract AC05-84OR21400. 28p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000002.

Oak Ridge National Laboratory prepares a report annually as mandated by the Toxic Substances Control Act that summarizes records required of owners/operators of facilities where PCBs (polychlorinated biphenyls) are in use. This report provides information on PCB and PCB-contaminated equipment in use and removed from service and PCB wastes generated, stored, and shipped off-site for treatment and disposal during calendar year 1986.

49155 **(SAND—87-1216) Estimating payload internal temperatures and radiator size for multimegawatt space platforms.** Dobranich, D. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1987. Contract AC04-76DP00789. 74p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE88000244.

A conceptual space platform consists of a payload, a power conditioning unit (PCU), and two radiators: the main radiator and a secondary radiator. A computer program was written to determine the required size of the two radiators and the temperatures of the PCU and payload for a given platform power level. An iterative approach is necessary because the required size of the main radiator depends on the size of the secondary radiator and vice versa. Also, the temperatures of the payload and PCU depend on the size of the radiators. The program user can subdivide the two radiators into any number of nodes to increase the accuracy of the radiant heat transfer solution. The use of more nodes also allows better prediction of the nonlinear temperature drop that occurs across the radiators as the working fluid deposits the platform's waste heat in the radiator. View factor expressions are automatically calculated for different choices of the number of nodes. The user can also select different separation distances between the various platform structures. A model is included to couple the radiant and conduction heat transfer that occurs between the payload and its meteoroid shell and between the PCU and its shell. Also, the program allows the use of a refrigerator to cool the payload. If a refrigerator is used, the program determines the amount of additional thermal power needed to run the refrigerator. The results of parametric calculations are included to demonstrate the use of the program.

9901 Management

REFER ALSO TO CITATION(S) 48091, 49115, 49118

49156 (ANL/TM—454) The Argonne Materials Order System. Bretscher, M.E.; Dion, D.J.; McCure, L.J.; Venard, J.T.; Caruthers, C.M. (ed.). (Argonne National Lab., IL (USA)). Aug 1987. Contract W-31109-ENG-38. 83p. NTIS, PC A05. File Number DE88000232.

The Argonne Materials Order System (ANL/TM 454) describes the procedures and controls implemented by Argonne National Laboratory for systems contracting. The executive summary (Chapter 1) lists the organizations directly responsible for the operation of the Argonne Materials Order System and gives a broad overview of the functions of the system. Chapter 2 of this document describes in detail how the system works, including internal controls. The appendices contain facsimiles of relevant forms and reports.

49157 (IFE/KR/E—87/001) Validation of techniques for simulating long range dispersal and deposition of atmospheric pollutants based upon measurements after the Chernobyl accident. Transfrontier atmospheric models (TRANSAM). Tveten, U. (Institute for Energy Technology, Kjeller (Norway)). Feb 1987. 12p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87752515.

Problem specifications and a time schedule for an international study of computerized simulation of transfrontier atmospheric contamination are presented. Started on the initiative of the Nordic Liaison Committee for Atomic Energy, the study will be based on international measurements after the Chernobyl accident.

49158 (INIS-mf—10957) Bhabha Atomic Research Centre (BARC) annual report 1985-1986. (Bhabha Atomic Research Centre, Bombay (India)). 1987. 84p. NTIS (US Sales Only), PC A05/MF A01. File Number DE87703270.

The research and development (R and D) activities and accomplishments during the financial year 1985-1986 of the Bhabha Atomic Research Centre, Bombay are reported. The BARC is a multidisciplinary laboratory engaged in R and D activities in the field of nuclear energy. The main thrust of the R and D activities of the Centre is aimed at: (1) achieving targets of India's nuclear power programme, (2) indigenisation of the various steps in the nuclear fuel cycle, (3) developing and propagating peaceful applications of nuclear science and technology in the country in fields such as agriculture, medicine and industry, (4) providing scientific support to regulatory functions associated with nuclear facilities and radiation protection activities in the country. The salient features of these R and D activities are described in the chapters entitled: (1) physical sciences, (2) chemical sciences, (3) materials and materials sciences, (4) life sciences, (5) radioisotopes, (6) reactors, (7) fuel cycle, (8) health and safety, (9) electronics and instrumentation, and (10) technical services. A list of publications by the staff-members during the report period is given at the end of each chapter. The R and D activities of the outstation units of BARC, namely, Nuclear Research Laboratory at Srinagar, High Altitude Research Laboratory at Gulmarg, Variable Energy Cyclotron Centre at Calcutta and Gauribidanur Seismic Array near Bangalore are also covered in the report. Other activities of the Centre include technology transfer and manpower training which are also described briefly. (M.G.B.).

49159 (OUP—87-11) Section for nuclear physics annual report, January 1-December 31, 1986. (Oslo Univ. (Norway). Fysisk Inst.). Apr 1987. 65p. NTIS (US Sales Only), PC A04/MF A01. File Number DE87752526.

The experimental activities have in 1986 as in the previous years mainly been centered around the cyclotron laboratory with the SCANDITRONIX MC-35 cyclotron. Most of the nuclear physics experiments have been related to the study of nuclear structure at high temperature. Experiments with the /sup 3/He-beam up to a particle energy of 45 MeV have continued, and valuable information regarding the cooling process in highly excited nuclei has been obtained. Theoretical studies of highly excited nuclei have continued, and there has been a fruitful cooperation between experimental and theoretical physicists.

49160 (RISO-R—543) Department of Energy technology annual progress report, 1 January-31 December 1986. Micheelsen, B.; List, F. (eds.). (Risoe National Lab., Roskilde (Denmark)). Feb 1987. 42p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87752503.

The general development of the Department of Energy Technology at Risoe during 1986 is presented, and the activities within the major subject fields are described in some detail. Lists of staff and publications are included.

49161 (UTNL-R—0192) Report of the research results with University of Tokyo, Nuclear Engineering Research Laboratory's Facilities in fiscal 1985. (Tokyo Univ., Tokai, Ibaraki (Japan). Nuclear Engineering Research Lab.). 1986. 132p. (In Japanese). NTIS (US Sales Only), PC A07/MF A01. File Number DE87703046.

The common utilization of the reactor 'Yayoi' and the electron linear accelerator in the Nuclear Engineering Research Laboratory advanced smoothly in fiscal year 1985. 21 themes using the reactor 'Yayoi' and of the related research and 23 themes using the linear accelerator were carried out, and the excellent results were obtained. As for the Yayoi, after the repair, abnormality was not found at all in the regular inspection, and it has been operated smoothly. As for the linear accelerator, in spite of the occurrence of troubles due to the remarkable secular deterioration after the lapse of ten years, rapid countermeasures were taken, accordingly, the expected machine time was used nearly 100 %. Due to the addition of new themes and the expansion of users, it is difficult to ensure sufficient machine time in the common utilization, but to devise the efficient use in future by putting the peripheral equipment in order and simultaneously carrying out plural themes is the subject. Several cases of the joint experiment with foreign researchers were also carried out. In this report, also eight cases of the short period study meetings held in fiscal year 1985 are included. (Kako, I.).

49162 (UTTAC—51) Annual report of the Tandem Accelerator Center, University of Tsukuba, April 1, 1985-March 31, 1986. (Tsukuba Univ., Sakura, Ibaraki (Japan). Tandem Accelerator Center). 1986. 154p. NTIS (US Sales Only), PC A08/MF A01. File Number DE87703047.

From November, 1985 to January, 1986, the accelerator was shut down for reconstructing and realigning the accelerator tubes. Thereafter, the beam transmission improved considerably, especially for polarized ion beam. The total chain operation time was 2735 hr, and the beam acceleration time was 2254 hr in academic year 1985. A new prebuncher was tested, and improvement was found in the beam width and beam utilization factor. A postbuncher was installed in the high energy beam line, and tested with beam. The construction of a new polarized ion source is in progress. Its ECR positive ion source has been completed and tested. Also a new Wien filter was installed, and the spin filter was calibrated. A new data taking and analyzing system "SHINE" has been developed, and its first version has been completed and used for experimental work. The CAMAC system has been used for the interface between the VAX 11 computer and the electronic modules for data acquisition. The experimental techniques for detectors, nuclear polarization work, heavy ion-induced nuclear physics, the study on charge exchange, the ion-induced emission of secondary electrons, ion backscattering spectrometry, application of Moessbauer effect and NMR and so on are reported. (Kako, I.).

9902 Mathematics And Computers

REFER ALSO TO CITATION(S) 47454

49163 (AD-A—181950/7/XAB) Design and specification of PDL: the prototype dataflow language. Final report. Wolfe, D.J. (Army Military Personnel Center, Alexandria, VA (USA)). May 1987. 141p. NTIS, PC A07/MF A01.

Several converging technologies have reached the point where they can be integrated and used to develop an advanced programming environment for writing parallel programs. These technologies include advanced graphics workstations, models of compu-

tation which can be used for parallel computation, and parallel architectures. Several manufacturers are providing commercially available parallel processing computers with potential for satisfying the performance requirements of many of today's computing problems. Unfortunately, these computers usually do not have adequate, user-friendly programming environments, and the progamming primitives supported by each machine are different. Thus, there is a need for a more-general, user-friendly programming tool. This thesis is concerned with the design and formal specification of a data-flow programming language which supports the simultaneous existence of graphical and textual representations for programs. The features of the language are synthesized from existing data-flow languages. The specification combines three formal specification techniques to formally specify the textual syntax, graphical representation, and semantics of the language. The specification serves as a rigorous, unambigous description of the language.

49164 **(AD-A—182111/5/XAB) Iterative solutions of sparse linear systems on systolic arrays. Technical report.** Melhem, R. (Pittsburgh Univ., PA (USA). Inst. for Computational Mathematics and Applications). Mar 1987. 24p. (ICMA—87-105). NTIS, PC A02/MF A01.

The idea of grouping the non-zero elements of a sparse matrix into few strips that are almost parallel is applied to the design of a systolic accelerator for sparse matrix operations. This accelerator is, then, integrated into a complete systolic system for the solution of large sparse linear systems of equations. The design demonstrates that the application of systolic arrays is not limited to regular computations, and that computationally irregular problems may be solved on systolic networks if local storage is provided in each systolic cell for buffering the irregularity in the data movement and for absorbing the irregularity in the computation.

49165 **(AD-A—182491/1/XAB) Two-dimensional signal processing and storage and theory and applications of electromagnetic measurements. Annual report, 1 January-31 February 1986.** Schafer, R.W.; Paris, D.T. (Georgia Inst. of Tech., Atlanta (USA). School of Electrical Engineering). 1 Jan 1987. 8p. NTIS, PC A02/MF A01.

The supplement consists of a printed table of contents of all papers and theses produced under this contract. Specific topics covered are: digital signal processing, parallel processing architectures, two-dimensional optical storage and processing, hybrid optical/digital signal processing, electromagnetic measurements in time domain, and automatic radiation measurements for near-field and far-field transformations. Microfiche of these papers are available from the corporate author directly.

49166 **(AD-A—182633/8/XAB) Systolic algorithms for the parallel solution of dense symmetric positive-definite Toeplitz systems. Research report.** Ipsen, I.C. (Yale Univ., New Haven, CT (USA). Dept. of Computer Science). May 1987. 24p. (YALEU/DCS/RR—539). NTIS, PC A02/MF A01.

Sponsored in part by Contract DAAL03-86-K-0158.

The most popular method for the solution of linear systems of equations with Toeplitz coefficient matrix on a single processor is Levinson's algorithm, whose intermediate vectors form the Cholesky factor of the inverse of the Toeplitz matrix. However, Levinson's method is not amenable to efficient parallel implementation. In contrast, use of the Schur algorithm, whose intermediate vectors form the Cholesky factor of the Toeplitz matrix proper, makes it possible to perform the entire solution procedure on one processor array in time linear in the order of the matrix. By means of the Levinson recursions it is shown that all three phases of the Toeplitz system solution process - factorization, forward elimination; and backsubstitution - can be based on Schur recursions. This increased exploitation of the Toeplitz structure then leads to more-efficient parallel implementations on systolic arrays.

49167 **(AD-A—182724/5/XAB) ONR (Office of Naval Research) research in distributed reasoning and planning. Interim report, February 1985-February 1987.** Konolige, K.G.; Georgeff, M.P.; Lansky, A.L. (SRI International, Menlo Park, CA (USA). Artificial Intelligence Center). May 1987. 126p. NTIS, PC A07/MF A01.

The goal of the Distributed Reasoning and Planning projects has been to provide fundamental research into the principles upon which a network of intelligent, cooperative computer agents can be based. The motivation for distributed system of intelligent agents arises when we consider problem domains with the following characteristics: 1) The environment is naturally partitioned, either spatially or functionally. An example of the former is a surveillance task in which several different areas must be patrolled; of the latter, assembly tasks in which major subcomponents can be assembled in parallel; 2) Each process's view of the environment is dynamic: other processes may be performing tasks at the same time, and chains of events may result from ongoing natural processes; 3) Each process has partial or imperfect knowledge of the environment; and 4) The cost of communication among processes may be high or the communication channels may be slow, so that there is a significant delay in sending large amounts of information.

49168 **(AD-A—182736/9/XAB) Automation recognition of tracking of objects. Final report, 1 January 1985-31 December 1986.** Aggarwal, J.K. (Texas Univ., Austin (USA). Computer and Vision Research Center). 31 Dec 1986. 24p. NTIS, PC A02/MF A01.

The Computer and Vision Research Center conducts a broad program of research in computer vision, image processing, and architectures for image processing. During the period of this report, several projects were pursued including those on positioning and tracking of objects moving in space, parallel image processing, and 3-D representation and recognition. The results on these six completed projects are briefly presented in this report: Representation of Objects from Range Maps; Hierarchical Data Structures for the Computation of 3-D Information from Multiple Views; Structure and Motion Computation from Point or Line Correspondences in Images; Surface Reconstruction and Representation of 3-D Scenes; Parallel 2-D Convolution on a Mesh-Connected Array Processor; and A Parallel Processing Technique Exploiting Image Parallelism via the Hypercube.

49169 **(CMI-R—862090-8) Aggregation and disaggregation in integer programming problems.** Hallefjord, Aa.; Storoey, S. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Dec 1986. 22p. NTIS (US Sales Only), PC A02/MF A01. File Number DE87753079.

Column aggregation of zero-one programming problems is considered. By relaxing the integer requirements in the aggregated problem, an easy problem results, the solution of which can be used to compute bounds on the loss of accuracy in the objective function value. It is shown how these bounds can be improved by identification of valid inequalities and by exploiting primal degeneracy. A small example is given to illustrate the procedure. 18 references.

49170 **(CMI-R—872090-2) Strong cutting plane algorithm for an assignment problem with side constraints.** Aboudi, R.; Nemhauser, G.L. (Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)). Mar 1987. 27p. NTIS (US Sales Only), PC A03/MF A01. File Number DE87753080.

This paper treats an assignment problem with the additional constraints that specified variables are required to be equal to each other. The problem arose in the evaluation of the classroom capacity of a large university. Some classes of facets of the convex hull of the 0-1 solutions are characterized. An algorithm is given for solving the separation problem over the polytope defined by the assignment constraints, the side constraints and a large class of facet defining inequalities. By using this algorithm and the simplex method, it is possible to solve most instances of the problem without branch-and-bound. 9 references, 3 figures.

49171 **(CONF-870984—1-Summ.) An empirical investigation of the use of ranks in πps sampling.** Wright, T. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 4p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87010609.

From 46. session of the International Statistical Institute; Tokyo, Japan (8 Sep 1987).

Let $U_1,U_2,...,U$/sub N/ be the N units of a finite population and let (y/sub i/,x/sub i/) be a vector of nonnegative components associated with the i/sup th/ unit, where the x's are known and the

y's are unknown. A sample of fixed size n(<N) is to be selected to estimate the unknown population total Y = sum of y/sub i/(i = 1,N). Let π/sub i/ be the probability of sample inclusion for the i/sup th/ unit. Many (e.g., Hansen and Hurwitz, 1943, and Brewer and Hanif, 1983) have realized improvements in efficiency by taking π/sub i/ = np/sub i/ where p/sub i/ = x/sub i//sum of x/sub j/(j = 1,N) is a normed measure of size for the i/sup th/ unit. Such plans, called probability proportional to size (πps) sampling plans, can be difficult to execute when sampling is without replacement (wor), particularly when n > 2. When a suitable variable x, which is directly proportional to the variable of interest y, is not available, one may know how to rank units reasonably well relative to the unknown y values before sample selection. When such ranking is possible, we introduce a simple and efficient πpswor sampling plan for general n using the ranks as the known x measures of size.

49172 (CONF-870984—2) Measures of diversity based on fuzzy multinomial distributions. Uppuluri, V.R.R.; Bhargava, T.N. (Oak Ridge National Lab., TN (USA); Kent State Univ., OH (USA)). 1987. Contract AC05-84OR21400. 3p. NTIS, PC A02. File Number DE87010617.

From 46. session of the International Statistical Institute; Tokyo, Japan (8 Sep 1987).

In this paper a fuzzy multinomial distribution is defined. Based on this, the entropy and a quadratic measure of diversity of a multinomial distribution are defined. These are illustrated by a numerical example, and problems for further study are indicated.

49173 (CONF-871101—6) General order nodal transport methods in weighted diamond difference form. Azmy, Y.Y. (Oak Ridge National Lab., TN (USA)). Nov 1987. Contract AC05-84OR21400. 9p. NTIS, PC A02/MF A01; GPO Dep. File Number DE87011117.

From Joint meeting of the American Nuclear Society and the Atomic Industrial Forum; Los Angeles, CA, USA (15 Nov 1987).

49174 (CONF-8704175—1) Machine intelligence applications to securities production. Johnson, C.K. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 15p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014569.

From International conference on security documents for the 21st century; San Diego, CA, USA (1 Apr 1987).

The production of security documents provides a cache of interesting problems ranging across a broad spectrum. Some of the problems do not have rigorous scientific solutions available at this time and provide opportunities for less structured approaches such as AI. AI methods can be used in conjunction with traditional scientific and computational methods. The most productive applications of AI occur when this marriage of methods can be carried out without motivation to prove that one method is better than the other. Fields such as ink chemistry and technology, and machine inspection of graphic arts printing offer interesting challenges which will continue to intrigue current and future generations of researchers into the 21st century.

49175 (DOE/DP/40200—48) A generalized EXIT. Pruitt, C. (Rochester Univ., NY (USA). Lab. for Laser Energetics). 1986. Contract FC08-85DP40200. 14p. University of Rochester, River Station Road, Rochester, NY 14627. File Number TI87014470.

This paper describes a proposed new FORTH word to replace "EXIT". The new word is called "curly EXIT". The new word is usable within DO loops because it marks the location within the return stack where the proper return address is located. The range of DO loop parameters is limited to non-negative or small unsigned values in the present implementation. (JDH)

49176 (DOE/ER—0341) ESNET [Energy Sciences Network]. (USDOE Office of Energy Research, Washington, DC. Scientific Computing Staff). Jun 1987. 232p. NTIS, PC A11. File Number DE88000009.

This document describes the Energy Sciences Network (ESNET) project which was undertaken by the Scientific Computing Staff during fiscal year (FY) 1986 at the direction of the Director, Office of Energy Research (ER). This document serves as the program plan for the ESNET project and is the result of the effort of the cross program Energy Sciences Network Steering Committee. The ESNET Steering Committee has been charged to codify the overall ER computer network requirements, to document and set priorities for computer networking requirements including performance objectives. Further, this committee has been asked to identify future ESNET functional characteristics, to identify research and development needs for the ESNET, to establish ESNET performance objectives and to define the intrastructure necessary to manage and operate the ESNET facilities.

49177 (DOE/ER/25026—8) Computational methods and software for differential equations and their applications: Annual report, December 1, 1986-November 30, 1987. Gear, C.W.; Skeel, R.D. (Illinois Univ., Urbana (USA). Dept. of Computer Science). Aug 1987. Contract FG02-87ER25026. 18p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014601.

This paper contains the annual report and continuing proposals on computational methods for Differential Equations. The areas of specific consideration are: Parallel and Waveform Methods for ODE and Analysis and Development of ODE Methods. (LSP)

49178 (DOE/ER/25026—11) Parallel methods for ordinary differential equations. Gear, C.W. (Illinois Univ., Urbana (USA). Dept. of Computer Science). Aug 1987. Contract FG02-87ER25026. 31p. (UILU-ENG—87-1754). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014667.

Remarkably few methods have been proposed for the parallel integration of ordinary differential equations (ODEs). In part this is because the problems do not have much natural parallelism (unless they are virtually uncoupled systems of equations, in which case the method is obvious). In part it is because the subproblems arising in the solution of ODEs (for example, the solution of linear equations) are the ones that have provided the challenges for parallelism. This paper surveys some of the methods that have been proposed, and suggests some additional methods that are suitable for special cases, such as linear problems. It then looks at the possible application of large-scale parallelism, particularly across the method. If efficiency is of no concern (that is, if there is an arbitrary number of processors) there are some ways in which the solution of stiff equations can be done more rapidly, in fact, a speed up from a parallel time of $O(N^3)$ to O(logN) for N equations might be possible if communication time is ignored. This is obtained by trying to perform as much as possible of the matrix arithmetic associated with the solution of the linear equations at each step in advance of that step and in parallel with the integration of earlier steps.

49179 (DOE/ER/25026—T1) The development of ODE methods: A symbiosis between hardware and numerical analysis. (Illinois Univ., Urbana (USA)). 1986. Contract FG02-87ER25026. 17p. NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014925.

The history of the numerical solution of ordinary differential equations is surveyed from its origins three centuries ago up to the early 1970s. The increasing demands for the solution of ODEs, especially for exterior ballistics and celestial mechanics, has been a primary stimulus of and a significant influence on the early development of computers starting with the analog differential analyzers and continuing to the first wired-program digital computers - whose form foreshadowed future developments in parallel computers. At the same time the hardware has, of course, affected the algorithms used, but this has resulted in surprisingly few innovations in numerical techniques. 57 refs.

49180 (DOE/ER/25034—1) SIAM [Society for Industrial and Applied Mathematics] conference on optimization, 18-20, 1987. (Society for Industrial and Applied Mathematics, Philadelphia, PA (USA)). 1987. Contract FG02-87ER25034. 53p. (CONF-8705190—Absts.; CONF-8705191—Absts.). NTIS, PC A04. File Number DE87014493.

From SIAM conference on optimization; Houston, TX, USA (18 May 1987).

This paper contains the abstracts to the SIAM conference on optimization. These abstracts are on algorithms, linear programming, and numerical analysis optimization. (LSP)

49181 (DOE/ER/60420—1, pp 665-680) **Optimizing interpreter for multidimensional products in computational chemistry.** Cole, S.J.; Purvis, G.D. III. (Univ. of Florida, Gainesville). 1986. John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158. File Number TI87009263. (CONF-8603121—Pt.2).

From Special Sanibel symposium; St. Augustine, FL, USA (8 Mar 1986).

The multidimensional product between an N-dimensional array B and an M-dimensional array C produces an (N + M - 2L)-dimensional array A from the dot-product-like contraction of L pairs of dimensions in B and C. For example, in the multiplication $A(i,j,k,l,...) = \Sigma\ B(i,a,j,b,...)\ C(l,a,b,k,...)$ a,b,... indices a,b,... are contracted, and the remaining indices i,j,k,l,... are mapped from matrices B and C to the target matrix A. They have developed an algorithm, which they incorporated into a program called GENPRD, for interpreting the topological description of a general multidimensional matrix product, optimizing the execution path, and finally evaluating the product. No specific information about the nature of a given product is included in the program. Instead, GENPRD is driven by two tables: one specifies the indices to be contracted and the mapping of the uncontracted indices to the target array; the second one indicates the organization of the arrays in secondary storage. The tables are text files which are read at execution time. The information is then processed to form an optimized set of loops for evaluating the product and performing associated I/O. GENPRD is implemented in a program for quantum-chemical computations using many-body perturbation theory and the coupled-cluster method. This implementation produced code that ran at 90% of the speed of the hand-coded version. Ultimately, GENPRD will reduce the FORTRAN code from 20,000 lines to 2000 lines.

49182 **(DP-MS—87-94) The Savannah River Plant automated office support system network.** Johnson, A.J. (Savannah River Lab., Aiken, SC (USA)). 1987. Contract AC09-76SR00001. 13p. (CONF-8710132—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014203.

From Department of Energy automated office support system conference; Denver, CO, USA (7 Oct 1987).

The Savannah River Plant (SRP) consists of 13 separate operating or administrative facilities or (areas) spread over 300 square miles of a federal reservation. A facility of this size presents unique difficulties to anyone attempting to provide a comprehensive, high-performance automated office support system (AOSS) network. The goal of the SRP AOSS project is to have each of these workers connected to and using the AOSS computer network by the end of 1988. By mid-1987, SRP was one quarter of the way to completing this goal. The fundamental AOSS strategy for SRP is the integration of personal computers with mid-size "departmental" computers located within each plant area with links to the site's mainframe computer systems and offsite databases. This integration is being provided by local area networks (LAN) in each plant area joined via a broadband communications system to form one sitewide internetwork. The SRP site internetwork is used to connect the departmental and mainframe computers together and to provide workstation-to-computer access between plant areas.

49183 **(ITEF—129-1986) Subroutine package for histogram selective filling.** Matsyuk, M.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1986. 14p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. File Number DE87703285.

Subroutine package for histogram selective filling developed on using the HBOOK subroutines is described. On the basis of available subroutines a program for statistical processing the data from 3-meter magnetic spectrometer is created. Subroutines are written in FORTRAN and realized at the BESM-6 computer. 4 refs.; 1 tab.

49184 **(LA—10889-M) The cell-coloring computer program user's manual: Version 1.0.** Wheat, B.M. (Los Alamos National Lab., NM (USA)). Sep 1987. Contract W-7405-ENG-36. 107p. NTIS, PC A06/MF A01; 1; GPO Dep. File Number DE88000194.

The Cell-Coloring Computer Program (CCCP) is an interactive graphic postprocessor designed to produce report-quality color plots of regularly spaced two- and three-dimensional data. Plots from the CCCP can be output to both color and black and white 35-mm film and to Tektronix terminals. Titles and logos can be added to enhance the plots for presentations. The CCCP can also be used to generate 16-mm color movies. The CCCP is used at Los Alamos National Laboratory to graphically analyze results from computer simulations of hypervelocity projectiles striking multilayered targets, as simulated using the LASOIL family of Eulerian hydrodynamic codes. Inputting the LASOIL data into CCCP allows us to scan and assimilate large amounts of information and enables us to display, analyze, and integrate this information with empirical data from other sources. The CCCP also allows selection of portions of the data so that a variety of color plots can be produced. These plots include material locations, contours, pseudo x ray, and three-dimensional perspectives of two-dimensional data. The color intensity of the material plots may be weighted by different data values such as density, pressure, energy, etc. Such color weighting has been useful in showing high- and low-density regions within a material and also in illustrating shock wave propagation across various materials. The CCCP has an extensive list of labels that can be assigned to identify the axis and data types. User-defined labels can also be added. An interactive help package is available to assist in the use of the many commands.

49185 **(LA—11017-M) A CAMAC Knobs Controller for the VAX control computer at LAMPF [Los Alamos Meson Physics Facility].** Smith, W.L. (Los Alamos National Lab., NM (USA)). Sep 1987. Contract W-7405-ENG-36. 63p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014633.

A CAMAC Knobs Controller has been developed for a VAX/VMS computer control system at the Los Alamos Meson Physics Facility (LAMPF). The Knobs Controller allows the facility operators to have slew control of program-selectable, remote-analog set-point channels and to monitor the progress of the control with an alpha-numeric display associated with each knob. This report discusses the hardware characteristics of the Knobs Controller and the system-software requirements for implementing this system.

49186 **(LA-UR—87-2842) Numerical solution of partial differential equations on irregular grids.** Levermore, C.D.; Manteuffel, T.A.; White, A.B. Jr. (Lawrence Livermore National Lab., CA (USA); Los Alamos National Lab., NM (USA)). 1987. Contract W-7405-ENG-36. 10p. (CONF-8708128—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014760.

From International symposium on computational fluid dynamics and international conference on computational techniques and applications; Sydney, Australia (24 Aug 1987).

The present paper discusses the order of error in numerical solutions of differential equations. In particular, the effect of size and shape of the grid imposed on the problem is examined. The author concludes that the rate of convergence is the same on an irregular grid as it is on a regular grid in many instances. 10 refs., 4 figs. (JDH)

49187 (LBL-PUB—615, pp A.1-A.18) **TELL-A-GRAF and SPSXS languages.** Colon-Sanchez, J. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

TELL-A-GRAF is an interactive graphic package written in Fortran that is widely used at Lawrence Berkeley Laboratory for graphic display and for producing hard copy for publications in reports. With TELL-A-GRAF you can realize many types of graphics in the same type of chart. That means that you can produce one

plot chart but with different kind of lines in the configuration aspect. It allows you to realize two different bar charts, the horizontal bar chart and the vertical bar chart. The authors can also produce pie charts. The user can input the labels in English and TELL-A-GRAF can print the same label in Russian, Greek, or Swedish. The SPSSX Batch System is a comprehensive tool for managing, analyzing and displaying data. It has many capabilities; one of them is to be able to input from almost any type of data file and device-independent graphics.

49188 (LBL-PUB—615, pp A.49-A.70) **SPSSX and TELL-A-GRAF-languages.** Padilla-Nevarez, A. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

Attempts are made to integrate two software packages. They are SPSSX, which is a statistical software package written in COBOL, and TELL-A-GRAF, which is a software package written in FORTRAN. The problem is that there are no software packages available from SPSSX to draw graphics. The only software package available is TELL-A-GRAF graphics package for which the output of SPSSX has to be adapted to.

49189 (LBL-PUB—615, pp A.91-A.145) **Language translation and software maintenance.** Torres, R. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

An attempt was made to convert a program called WORD2PS.c into a Lex program called WORD2PS.1. WORD2PS is a program which translates documents written in the Word-11 language into the Postscript language. The translation is made up of three phases: first, relevant macro files are determined and read; second, the document is processed, all World-11 commands are recognized and the appropriate Postscript commands are output; third, all literal text are output as Postscript strings. The problem was to rewrite the WORD2PS program written entirely in C language into a program which has sections written in Lex. In Lex WORD2PS or any other program is easier to maintain because extension may be added, sections may be changed and bugs may be fixed with little difficulty.

49190 (LBL-PUB—615, pp A.169-A.179) **Performance analysis of Ethernet.** Francis, P. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

The Ethernet local area network provides a communication facility for high speed data exchange (e.g., electronic mail, file transfers, remote log-on) among computers and other digital devices located within a moderate-sized geographic area (a radius of 2.5 kilometers). The computers are physically connected by a shielded coaxial cable. Data is transmitted at a rate of 10 million bits per second. This kind of network can support up to 1024 computing devices. Ethernet has been used extensively at Lawrence Berkeley Laboratory (LBL) to interconnect of all of its major computing machines. LBL has two large incompatible local networks. One is DECNET, which comprises mostly Vaxes running the VMS operating system. These speak to each other via DECNET communication procedures (or protocol). The other is a network comprising mainly of Vaxes running UNIX, and they communicate with each other via the TCP/IP protocol. These two networks are connected via gateways and are incorporated into the Internetwork environment. The object of this research is to study the characteristics of the network with a view to identifying those factors which tend to have a negative effect on performance. It is hoped that the results will serve as a basis for making recommendations to allow for more efficient utilization of the network.

49191 (LBL-PUB—615, pp A.181-A.188) **Software maintenance and program conversion.** Holt, R. Sep 1986. NTIS, PC A11/MF A01. File Number DE87012028.

In Lawrence Berkeley Laboratory, Jackson State University, Ana G. Mendez Educational Foundation Consortium: Progress report, October 1985-September 1986.

A Pascal program was translated to BASIC which enables technicians to read the trimcoils of the cyclotron by computer instead of manually. Two small programs were also written to modify the data set of a large program which predicts trimcoils settings for different elements. The large program is called CYDE.

49192 (ORNL—6362, pp 3-13) **Representational issues in machine learning.** Liepins, G.E.; Hilliard, M.R. Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

Classifier systems are numeric machine learning systems. They are machine counterparts to the natural genetic process and learn by reproduction, crossover, and mutation. Much publicity has been attended to their ability to demonstrate significant learning from a random start and without human intervention. Less well publicized is the considerable care that must be given to the choices of parameter settings and representation. Without the proper nurturing environment genetic algorithms are apt to learn very little. This infusion of human intelligence is often discounted, but the choice of appropriate representation forms the core of much of the current genetic algorithm research. This paper will address some of the representational issues from the perspective of two current experiments, one with scheduling and the other with a simulated robot. 10 references, 10 figures.

49193 (ORNL—6362, pp 15-21) **Rewriting system with explanations.** Chen, H.G.; Cockett, J.R.B. Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

This paper reviews the theory of rewriting and describes a program for implementing rewriting systems. To make the explanations of rewritings natural, several facilities must be added to a basic rewriting program. These facilities include: call by name and call by value rewriting, quiet and recursive rewriting, inherited and synthesized attributes. In addition, an accounting system is used to increase efficiency, while metal-level rule specification can be used to provide compact definitions of rewriting rules sharing the same characteristics. 9 references.

49194 (ORNL—6362, pp 23-33) **Proof synthesizer based on the theory of constructions.** Zaionc, M. (Univ. of Alabama, Birmingham). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

In this paper is presented the algorithm for construction the natural deduction proof in the propositional intuitionistic and classical logics. Proofs are constructed as the closed term of the given formula-as-type. The soundness and completeness of this method are proved. 9 references.

49195 (ORNL—6362, pp 35-49) **State estimation in finite stochastic decision trees.** Zrida, J.; Birdwell, J.D.; Cockett, J.R.B. Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

In this paper, stochastic decision trees are introduced, their properties are explored, and they are used to define a class of state estimation problems. The basic manipulations of idempotence, transposition, and repetition, defined for deterministic decision trees, are extended to the stochastic case. A manipulation of a stochastic decision tree not only alters the structure of the calculations can then be viewed in terms of structural manipulations. This fact may be used to solve certain classical state estimation problems, and more generally, to represent probabilistic/uncertain knowledge in expert systems. 13 references, 4 figures.

49196 (ORNL—6362, pp 53-56) **Substitutional pattern matching of clauses in a fuzzy expert system.** Hall, L.O. (Univ. of South Florida, Tampa). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

The problem of determining the schemas contained in mathematical word problems on the fifth to eighth grade level can be solved by the use of a fuzzy expert system. The application requires some unique functionality in the expert system. The schemas can be stated in different manners and different sets of schemas may be used to solve one problem. An existing expert system, Fess, is being enhanced for this application. In order to allow a relatively small amount of general knowledge to be used template implication relations will be provided in the system. Clauses in the relation may match several different facts at an instantiation providing multiple evidence and/or conclusions. Terms in the clause may be substituted for, which provides the template capability. The problem and the solution are discussed in the paper. 16 references.

49197 (ORNL—6362, pp 57-58) **Problems of partial matching of facts in an expert system.** Bouchon, B.; Despres, S. (Universite Paris VI, France). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

An important problem appears when we use the knowledge base of an expert system, dealing with the adequation of observed facts for the premises of the rules given by the expert. In the case where we do not use any ambiquity in the description of situations, the matching of facts characterizing the observation with the situation expressed in the premise of the rule is solved by means of a unification process. To avoid stopping the inference when the observed fact is slightly different from the antecedent of the rule, we can use a fuzzy description of the situations. The fuzzy logic provides a general framework to cope with this king of problem and the generalized modus ponens associated with the fuzzy implication, introduced by L.A. Zadeh, allows partial matching between fact. Several fuzzy implications exist, and enable us to evaluate the strength of an inference involving imprecise antecedent and/or consequent, various combination operators are then available to express the generalized modus ponens. We compare some of them through their behavior in characteristic cases. 10 references.

49198 (ORNL—6362, pp 59-67) **Uncertainty methodologies used in expert systems: synthesis of approaches.** Tonn, B.; Uppuluri, R. Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

Numerous methodologies have been developed to represent and control the propagation and combination of uncertainty in expert systems. Four of the more prominent methodologies are discussed, Bayesian theory, Certainty Factors, Dempster-Shafer Theory, and Endorsement Theory. A subset of rule and conditions endorsements is synthesized with the certainty factor uncertainty propagation method and an altered Dempster-Shafer combination method to produce a new approach. 7 references, 1 table.

49199 (ORNL—6362, pp 69-74) **Non-monotonic derivations which preserve pragmatic truth.** Suchenek, M.A. (Wichita State Univ., KS). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

In the paper, the model-theoretic finite forcing, has been used in the construction of certain well motivated and relatively well behaved non-monotonic logic. Different non-monotonic logics, including the above have then been compared from the reconstructional point of view. 13 references.

49200 (ORNL—6362, pp 77-85) **Provision of induction as a problem solving method in data model systems.** Hartzband, D. (Digital Equipment Corp., Hudson, MA). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

Research currently underway in the Artificial Intelligence Technology Group has focused on the development of a data model that is homomorphic with a human perception of knowledge representation. The development of this model has allowed a model-theoretic approach to be taken toward machine representation and problem solving. The approach taken to problem solving has also focused on methods which are homomorphic with human methods. Considerable work done in psychology cognitive science and decision analysis in the past 20 years has indicated that human problem solving methods are primarily comparative (that is analogic) and proceed by successive refinement of comparisons among known and unknown entities (e.g. Carbonell, 1985; Rummelhart and Abrahamson, 1973; Tversky, 1977). A series of algorithms has been developed to provide analogic (Hartzband et al. 1986) and symmetric comparative induction methods (Hartzband and Holly, in preparation) in the context of the homomorphic data model previously referred to. These general methods can be combined with heuristics and structural information in a specific domain to provide a powerful problem solving paradigm which could enhance human problem solving capabilities. 10 references, 1 table.

49201 (ORNL—6362, pp 87-96) **Interactive system to generate primes and minimal covers from a set of production rules.** Arrowood, L.F.; Cockett, J.R.B. Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

An interactive system has been developed to generate primes for a set of production rules and to find the minimal covers of these primes. Primes are produced by a pairing process similar to resolution which finds all the minimal disjuncts. Before searching for covers, heuristics can be applied to reduce the number of possibilities, thereby accelerating the covering process. The covering algorithm is a sophisticated depth-first search which never explores the same path twice and whose order of search can be heuristically controlled. The system was built to assist in the development of knowledge bases; it makes errors and inconsistencies apparent by producing unexpected conclusions. 7 references, 1 table.

49202 (ORNL—6362, pp 97-107) **Design of a student record.** Rundensteiner, E.A.; Hawkes, L.W. (Florida State Univ., Tallahassee). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

Being able to individualize instruction one way in which an Intelligent Computer-Assisted Instruction System, ICAI, is made more intelligent than a Computer-Assisted Instruction System, CAI. An example of an ICAI system for training children in arithmetic problem-solving called TAPS currently under development is described. Within the framework of TAPS the Student Record component, which is the basis for individualized instruction, is presented. Issues raised during the design process of the Student Record are discussed and possible solutions are proposed. The goal is to develop some general concepts of relevance for the Student Record of any ICAI system. Finally this design is contrasted with the different approaches chosen in the literature toward student modeling. 18 references.

49203 (ORNL—6362, pp 109-116) **Multi-expert expert systems.** Kantor, P.B. (Case Western Reserve Univ., Cleveland, OH). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

The authors consider some of the design constraints that an expert system must satisfy if it is to negotiate with, or have its suggestions combined with those of other expert systems. Two principle variants are considered. In the first variant each system is able to provide cardinal utility evaluations. This permits the implementation of an aggregator based on principles developed by Nelson and Kantor. In the second approach each expert system is able to negotiate, by incorporating into its own knowledge base the fact that one or more other expert systems have disagreed with it. This will

permit implementation of a Delphi approach as proposed by Reisman. 8 references.

49204 (ORNL—6362, pp 119-130) **Syntactic optimization of decision trees.** Herrera, J.A.; Cockett, J.R.B. Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

An algorithm for finding all the irreducible forms of a decision tree is discussed. An irreducible is a syntactic form for a tree which is guaranteed to be optimal for some reasonable cost criterion (for example, an expected testing cost). A crucial step in this procedure is to avoid the generation of forms which are trivial variants of one another. An algorithm to accomplish this is also presented. This algorithm, which is called separation planning, can be applied dynamically, allowing the order of generation of irreducible forms to be controlled by the structure of the initial tree. 26 references.

49205 (ORNL—6362, pp 131-139) **Theory of usuality.** Lee, E.T. (Univ. of Louisiana, Baton Rouge). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

Fuzziness, randomness, probabilistic fuzzy events, fuzzy probabilistic events and linguistic variable approach are briefly discussed. Quantitative measures of usuality and unusuality are defined. According to these measures, it is proved that: (i) For arbitrary fuzzy subsets F and G, the degree to which the union of F and G qualifies to be a usual value of X is greater than or equal to the maximum of μ/usually/ (F) and μ/sub usually/ (G). (ii) For arbitrary fuzzy subsets F and G, the degree to which the intersection of F and G qualifies to be a usual value of X is less than or equal to the minimum of μ/sub usually/ (F) and μ/sub usually/ (G). If J is a subset of K, then it is proved that: (iii) The degree to which the union of J and K qualifies to be a usual value of X is equal to the maximum of μ/sub usually/ (J) and μ/sub usually/ (K) which is equal to μ/sub usually/ (K). (iv) The degree to which the intersection of J and K qualifies to be a usual value of X is equal to the minimum of μ/sub usually/ (J) and μ/sub usually/ (K) which is equal to μ/sub usually/ (J). In addition, it is proved that: (v) The degree to which an arbitrary fuzzy subset F qualifies to be an unusual value of X is equal to μ/sub usually/ (F vector) where F vector is the complement of F. (vi) The degree to which F vector qualifies to be an unusual value of X is equal to μ/sub usually/ (F). With the quantitative measures of usuality and unusuality together with the above theorems, the authors can develop various properties of usual values and construct an inferential system for reasoning with usuality-qualified propositions of the form usually (X is F) and usually (if X is F then Y is G). The results obtained in this paper have useful applications in the management of uncertainty in expert systems, robotics, intelligent systems and other related areas. 11 references.

49206 (ORNL—6362, pp 141-147) **Algebraic versus probabilistic independence in decision theory.** Wong, S.K.M.; Ziarko, W. (Univ. of Regina, Saskatchewan). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

The concept of independence (dependence) between the condition and decision attributes plays an important role in the design of expert systems, decision tables, pattern recognition, and machine learning, etc. However, most of the investigations were devoted almost exclusively to the study of algebraic independence (dependence). The main objective of this paper is to show that the decision-theoretic approach based on algebraic independence is inadequate particularly when one deals with information uncertainty inherent in the knowledge representation system. It is shown that the notion of probabilistic independence is more appropriate to describe attribute independence in decision theory. The probabilistic independence is a stronger condition than the algebraic independence. A statistical measure of the "degree" of independence is proposed. Within this framework, it is demonstrated that the condition and decision attributes can be regarded to be truly independent of each other only if they are uniformly probabilistically independent,i.e. the knowledge of the values of the condition attributes alone do not give us any information about the values of the decision attributes. 3 references.

49207 (ORNL—6362, pp 149-169) **Linguistic similarity relations.** Zhang, W.R.; Bezdek, J.C.; Pettus, R.O. (Univ. of South Carolina, Columbia). Jan 1987. NTIS MF A01 . File Number DE87006025. (CONF-8610193—).

From International colloquia on methodologies for intelligent systems; Knoxville, TN, USA (25 Oct 1986).

First, the authors introduce the notions of Linguistic Fuzzy Relations (LFR), Linguistic Similarity Relations (LSR), and t-Level Sets, which are proposed based on the theory of numerical similarity relations, Zadeh's extension principle, and the term set definitions. Then the concept of Linguistic Transitive Closure (LTC) is proposed. A relation matrix of a LFR has elements which are linguistic terms instead of real numbers in [0,1]. Each linguistic term has one predefined fuzzy subset as a static prototype, and may have an infinite number of approximately matched synonyms. The terms may be subjectively entered to a matrix in a database or derived from linguistic approximation. Algorithms for computing the linguistic transitive closures of the a LFR matrix by extended max-min, extended max-product, and extended max-Δ are described. A number of interesting features of Linguistic Similarity Relations and Linguistic Transitive Closures are identified and illustrated by computational examples. 18 references, 3 figures, 4 tables.

49208 **(ORNL—6393) IMPSOR: A fully vectorized FORTRAN code for three dimensional moving boundary problems with Dirichlet or Neumann boundary conditions.** Williams, W.A.; Wilson, D.G. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 38p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014964.

This report documents IMPSOR, a FORTRAN code that implements finite difference methods for multidimensional moving boundary problems with Dirichlet or Neumann boundary conditions on a Cray X-MP. The geometry of the spatial domain is a rectangular parallelepiped. The dimensions of the parallelepiped are specified by the user. Dirichlet or Neumann boundary conditions may be specified on each face of the box independently. The initial conditions are arbitrary. The user defines the initial and boundary conditions as well as the thermal and physical properties of the problem. Additionally, several parameters of the numerical method, e.g., degree of implicitness, time step size, are also specified by the user.

49209 **(ORNL/TM—9912) A collection of test problems for ordinary differential equation solvers which have provisions for rootfinding.** Thompson, S. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 30p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000045.

Several popular ordinary differential equation (ode) solvers contain provisions for locating roots of functions which depend on the solution of the ode. A collection of problems for testing such solvers is described in this report. In addition to several well-known problems, the collection contains other interesting problems which have not previously appeared in the literature.

49210 **(ORNL/TM—10434) Implementation and evaluation of several continuously imbedded methods of Sarafyan.** Thompson, S. (Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 34p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000025.

Several of Sarafyan's continuously imbedded methods have been implemented and evaluated. This study discusses several important implementation questions and presents results that demonstrate the effectiveness of the resulting software. The results indicate that Sarafyan's methods are well-suited for the solution of ordinary differential equations requiring rootfinding to handle special events and interpolation for dense output. The results further indicate that the software based on several of the higher order methods

is competitive with other widely-used general purpose Runge-Kutta software.

49211 **(ORNL/TM—10498) Personal and organizational consequences of microcomputer use in the Naval Military Personnel Command.** Morell, J.A. (Oak Ridge National Lab., TN (USA)). Jul 1987. Contract AC05-84OR21400. 54p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE88000003.

This study is a preliminary effort to both determine the impact of microcomputer use within the N4 (detailing) branch of the Naval Military Personnel command and develop a methodology for making further assessments on a wider scale. The study found three main areas of impact of microcomputer use: budgeting, nonfiscal planning, and time savings. In the budgeting area, small work groups were able to keep better track of available funds, and to make more accurate estimates of funds that would be available in the future. As a result there was better cooperation between detailing groups and those with financial oversight responsibilities. Also, work was better paced to the availability of funds. Improvements in nonfiscal planning centered on the use of more and better information for planning and decision making. The primary advantages of "time savings" were allowing people to do new tasks and giving people opportunities to do better analyses of problems. Overall, these impacts was highly positive, and there were no serious negative consequences.

49212 **(PNL—6279-Vol.3) Hanford Meteorological Station computer codes: Volume 3, The TANK computer code.** Buck, J.W.; Andrews, G.L. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1987. Contract AC06-76RL01830. 31p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87014808.

At the end of each graveyard shift the Hanford Meteorological Station (HMS), operated by Pacific Northwest Laboratory, issues a forecast of eight hourly average wind speeds and wind gusts for the 50-ft level. The Hanford Waste Management crew uses this forecast, called the tank farm forecast, to schedule daily work loads. The forecast covers an 8-hour period [0800 to 1600 during Pacific Standard Time (PST) or 0700 to 1500 during Pacific Daylight Time (PDT)] and the day-shift forecaster may modify the tank farm forecast to reflect changing wind conditions. The TANK computer code is used to archive these forecasts and apply quality assurance checks to the forecast data. The code accesses an input file, which contains the date of the previous forecast, and an output file, which contains tank farm forecasts for the current month. The program includes a data entry form consisting of 12 fields that must be filled in by the user. The information entered on the form is appended to the monthly forecast file, which provides an archive for the tank farm forecasts. This volume describes the implementation and operation of the TANK computer code at the HMS.

49213 **(PNL—6279-Vol.4) Hanford Meteorological Station computer codes: Volume 4, The SUM computer code.** Andrews, G.L.; Buck, J.W. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1987. Contract AC06-76RL01830. 28p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000311.

At the end of each swing shift, the Hanford Meteorological Station (HMS), operated by Pacific Northwest Laboratory, archives a set of daily weather observations. These weather observations are a summary of the maximum and minimum temperature, total precipitation, maximum and minimum relative humidity, total snowfall, total snow depth at 1200 Greenwich Mean Time (GMT), and maximum wind speed plus the direction from which the wind occurred and the time it occurred. This summary also indicates the occurrence of rain, snow, and other weather phenomena. The SUM computer code is used to archive the summary and apply quality assurance checks to the data. This code accesses an input file that contains the date of the previous archive and an output file that contains a daily weather summary for the current month. As part of the program, a data entry form consisting of 21 fields must be filled in by the user. The information on the form is appended to the monthly file, which provides an archive for the daily weather summary. This volume describes the implementation and operation of the SUM computer code at the HMS.

49214 **(PNL—6317) PCDAS Version 2.2: Remote network control and data acquisition.** Fishbaugher, M.J. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1987. Contract AC06-76RL01830. 139p. NTIS, PC A07/MF A01; 1; GPO Dep. File Number DE87014823.

This manual is intended for both technical and non-technical people who want to use the PCDAS remote network control and data acquisition software. If you are unfamiliar with remote data collection hardware systems designed at Pacific Northwest Laboratory (PNL), this introduction should answer your basic questions. Even if you have some experience with the PNL-designed Field Data Acquisition Systems (FDAS), it would be wise to review this material before attempting to set up a network. This manual was written based on the assumption that you have a rudimentary understanding of personal computer (PC) operations using Disk Operating System (DOS) version 2.0 or greater (IBM 1984). You should know how to create subdirectories and get around the subdirectory tree.

49215 **(RFP—4104) Personal computers: A powerful tool for project management.** Hughes, T.A. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 1987. Contract AC04-76DP03533. 11p. (CONF-871028—4). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013381.

From Instrument Society of America international conference and exhibit; Anaheim, CA, USA (5 Oct 1987).

Availability of low cost hardware and software within the past few years has made the Personal Computer a powerful tool for Project Management. Project managers very effectively apply word processing, cost accounting spreadsheets, and data management software to make their jobs easier. An important aspect of personal computers lies in their ability to improve productivity of the project design team. Project information can now be gathered, stored, and presented in a more useful form. Direct benefits are the detecting of cost overruns and scheduling problems through improved data analysis. This paper will discuss the use of Personal Computers in cost analysis, planning, tracking, and controlling instrumentation projects. Practical applications will be discussed and the advantages and disadvantages of available software will be reviewed.

49216 **(SAND—87-1380C) The method of lines for time dependent free boundary problems.** Womble, D.E. (Sandia National Labs., Albuquerque, NM (USA)). 1987. Contract AC04-76DP00789. 40p. (CONF-8709123—1). NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE87013929.

From NASIG meeting; Truckee, CA, USA (21 Sep 1987).

The method of lines is used to semi-discretize a time dependent free boundary problem. The resulting ordinary differential equations are solved and an approximate solution to the continuous problem is constructed. In the case of the moving contact problem, a variational inequality form of the problem exists and the variational inequality can be used to prove the convergence of the approximate solution to the true solution. As a numerical example, the solidification of a binary alloy natural convection is presented. 14 refs.

49217 **(SOL—87-11) An analysis of an available set of linear programming test problems.** Lustig, I.J. (Stanford Univ., CA (USA). Systems Optimization Lab.). Aug 1987. Contract FG03-87ER25028;FG03-87ER25030. 55p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE87014578.

A set of linear programming test problems is analyzed with MINOS, Version 5.1. The problems have been run with different options for scaling and partial pricing to illustrate the effects of these options on the performance of the simplex method. The results indicate that the different options can significantly improve or degrade the performance of the simplex method, and that these options must be chosen wisely. For each problem a picture of the nonzero structure of the matrix A is also presented so that the problems can be classified according to structure.

49218 (UCID—21159) The Livermore Loops in Sisal. Feo, J.T. (Lawrence Livermore National Lab., CA (USA)). 26 Aug 1987. Contract W-7405-ENG-48. 80p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000441.

The Livermore Loops are 24 computational kernels found frequently in large-scale scientific computations. Sisal is a functional language being developed at Lawrence Livermore National Laboratory, to provide a programming medium in which to express large-scale scientific processes for execution on multiprocessor systems comprising hundreds, even thousands, of processors. For Sisal to be successful, it must express clearly and concisely the parallelism found most frequently in scientific computations. We present and discuss a Sisal implementation of the Loops from both a programming and execution viewpoint. In addition, we given the parallel execution traces of all 24 loops as simulated by our interpreter. 14 refs.

49219 (UCRL—96080) Layering central authentication on the interactive services of an existing homogeneous distributed system. Nessett, D.M. (Lawrence Livermore National Lab., CA (USA)). Feb 1987. Contract W-7405-ENG-48. 21p. (CONF-871141—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87011544.

From Symposium on operating systems principles; Austin, TX, USA (9 Nov 1987).

Provision of interactive terminal service in a distributed system requires mechanisms to establish and disestablish a terminal session (i.e., to logon and logoff) as well as to move textual data between the terminal host and remote host. Logon occurs in most distributed systems subsequent to the establishment of a terminal session by means of host specific logon procedures. However, in a distributed system of any size, this approach leads to security and password management problems. When the distributed system is homogeneous, these problems can be rectified through the use of a central authentication service that presents a common logon interface to the user for all distributed system hosts. Normally, central authentication is provided by either initially designing it into a distributed system or supporting it through the modification of existing distributed system and host operating system software. As an alternative strategy, central authentication can be layered onto the existing interactive terminal services of a distributed system. An experiment to assess the feasibility of this approach was carried out. The results demonstrate that layering can be used in certain circumstances to provide central authentication services. The experiment also determined what terminal service features are necessary so that central authentication is easily added to a distributed system. Recommendations are made concerning how to structure terminal services in a distributed system so that central authentication is effectively achieved.

49220 (UCRL—96707) The Macintosh computer as a tool for rapid data analysis and for producing camera ready viewgraphs/publications. Beiriger, J.M. (Lawrence Livermore National Lab., CA (USA)). Aug 1987. Contract W-7405-ENG-48. 5p. (CONF-871061—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014350.

From 33. annual bioassay analytical and environmental radiochemistry conference; Livermore, CA, USA (6 Oct 1987).

The graphics capability of the Macintosh computer has been utilized for plotting of experimental data for analysis. The Macintosh has also been used in producing viewgraphs.

49221 (UCRL—96730) ISLE [Image and Signal Lisp Environment]: A functional language interface for signal and image processing. Azevedo, S.G.; Fitch, J.P. (Lawrence Livermore National Lab., CA (USA)). May 1987. Contract W-7405-ENG-48. 6p. (CONF-871162—1). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87013785.

From 21. annual asilomar conference on signal, systems, and computers; Pacific Grove, CA, USA (2 Nov 1987).

Conventional software interfaces which utilize imperative computer commands or menu interactions are often restrictive environments when used for researching new algorithms or analyzing processed experimental data. We found this to be true with current signal processing software (SIG). Existing "functional language" interfaces provide features such as command nesting for a more natural interaction with the data. The Image and Signal Lisp Environment (ISLE) will be discussed as an example of an interpreted functional language interface based on Common LISP. Additional benefits include multidimensional and multiple data-type independence through dispatching functions, dynamic loading of new functions, and connections to artificial intelligence software.

49222 Telerobotic technology for nuclear and space applications. Herndon, J.N.; Hamel, W.R. (Oak Ridge National Lab., TN). *AIAA Paper;* 13(Mar 1987). (AIAA-Paper—8-1690; CONF-870395—).

From American Institute of Astronautics and Aeronautics, National Aeronautics and Space Administration and U.S. Air Force (AIAA/NASA/USAF) symposium on automation, robotics and advanced computing for the N; Arlington, VA, USA (9 Mar 1987).

Developments in telerobotics applicable to nuclear and space environments are discussed. The advanced servomanipulator (ASM) slave arm force-reflected servomanipulators designed for modular remote maintainability of the Advanced Integrated Maintenance System is examined. Consideration is given to the master controller, transporter, interface package, operator control station, and the control system for the ASM arm. A prototype of a telerobot capable of performing the activity of an astronaut during EVA is developed. The mechanical and control system features of the telerobot are described. 10 references.

49223 Improved statement of optimality for sequential probability ratio tests. Simons, G. (Univ. of North Carolina, Chapel Hill). *Annals of Statistics;* 4: No. 6, 1240-1243(1976).

An improved version of the optimality property of sequential probability ratio tests is described. Alternatives to error probabilities, as measurements of precision, are suggested. 6 references.

9903 Information Handling

REFER ALSO TO CITATION(S) 47440, 48091, 49165, 49215

49224 (CONF-8710147—1) The impact of information technology on research in science and engineering. Morell, J.A. (Oak Ridge National Lab., TN (USA)). 1987. Contract AC05-84OR21400. 29p. NTIS, PC A03/MF A01; 1; GPO Dep. File Number DE88000342.

From Howard R. Davis Society for knowledge utilization; Pittsburgh, PA, USA (9 Oct 1987).

There is little research on the impact of information technology (IT) on how research is carried out by scientists and engineers. This paper draws on other bodies of writings which indirectly shed light on this question. Included are: the role of calculation in research, scientific productivity, the philosophical underpinnings of science and technology, systems analysis, and the use of computer aided design in engineering. A model is developed which helps identify the types of impact that IT may have on social system and epistemological aspects of research. Factors are hypothesized which may explain why IT may have particular effects in any given research endeavor.

49225 (DOE/TIC—7000-R7) Energy Data Base: Subject Thesaurus. Raridon, M.H. (ed.). (USDOE Office of Scientific and Technical Information, Oak Ridge, TN). Sep 1987. 1027p. NTIS, PC A99/MF A01; 1; GPO Dep. File Number DE87008007.

This seventh edition of the subject thesaurus contains the standard vocabulary of indexing terms (descriptors) developed and structured by the technical staff of the Office of Scientific and Technical Information as part of its subject indexing activities for building and maintaining the Energy Data Base (EDB) and other energy information data bases for the Department of Energy (DOE). The purpose of this thesaurus is to enhance the efficiency of information retrieval from these data bases. This structured vocabulary reflects the scope of DOE's research, development, and technological programs and encompasses terminology derived not only from the basic sciences for also from areas of energy resources, conservation, ıfety, environmental impact, and regulation. There are 21,080 valid descriptors and 5683 forbidden terms in this edition of the Thesaurus. These descriptors are listed alphabetically.

49226 (DP-MS—87-92) Automated office support systems Savannah River Plant site summary. Stanland, C.F. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant). 1987. Contract AC09-76SR00001. 7p. (CONF-8710132—2). NTIS, PC A02/MF A01; 1; GPO Dep. File Number DE87014122.

From Department of Energy automated office support system conference; Denver, CO, USA (7 Oct 1987).

In January of 1985, du Pont management commissioned a study of how the long-term information needs of the site could be met. The result of this study was a 10-year plan calling for the implementation of a sitewide information system which would include: extensive local area networks, personal computers in all work locations, direct workstation to workstation and workstation to central computing facility access, and Office Automation and CAD/CAM computers. In late 1985, the Computer Projects Department (CPD) was formed to address the recommendations of the information system plan. The primary goal of CPD was to procure and install personal and office computers and the networks necessary to tie them together. This paper contains a description of the progress made to date toward these goals.

49227 (K/CSD/INF—87/10) IDMS application documentation made easy. Crisp, R.L.; Ratliff, J.M.; Thomas, P.B. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). Apr 1987. Contract AC05-84OR21400. 61p. NTIS, PC A04/MF A01; 1; GPO Dep. File Number DE88000199.

This report is written for the knowledgeable IDMS user to describe the methods and standards adopted by the EMIS section for the continuing documentation of the IDMS-based Engineering Management Information System. The methods and standards developed are based around using the Cullinet IDMS Integrated Data Dictionary (IDD) facility to maintain system documentation as an integral part of the system software. The documentation procedures described represent a relatively pain-free way to maintain system documentation and provide for complete, quality-assured documentation that is kept up-to-date as the application evolves. It also provides a readily available storehouse of system information which is useful for training new staff members, providing information needed for system enhancements, and for providing for users technical consultation on system functions.

49228 (ORNL/TM—10520) Implementing and managing change: A guide for assessing information technology. Morell, J.A.; Gryder, R.; Fleischer, M. (Center for Social and Economic Issues, Ann Arbor, MI (USA); Oak Ridge National Lab., TN (USA)). Aug 1987. Contract AC05-84OR21400. 100p. NTIS, PC A05/MF A01; 1; GPO Dep. File Number DE88000035.

Assessing the impact of office automation (OA) requires expertise in the generic aspects of evaluation and innovation adoption, combined with specialized knowledge of OA. There is an extensive literature on the two generic subjects, but no companion literature concerning the application of the knowledge to the unique case of OA. By providing that specialized information, this report assists the implementors of OA in two ways: it shows them how to monitor implementation efforts, thus providing feedback to facilitate adoption of OA technology; and it provides guidance for measuring OA's impact on people and organizations. The report assumes an immediate impact of OA on the work groups where the technology is implemented, and a continually spreading effect from that locus of immediate use. Included in the report are discussions of: sources of data, methods of data collection, factors which affect implementation, and measures of impact. Special attention is given to measuring productivity changes that may result from the use of OA. A detailed appendix supplies a variety of examples which show how the variables discussed in the report were actually measured in applied settings.

9905 Civilian Defense

49229 (AD-A—182508/2/XAB) Vulnerability evaluation of the keyworker blast shelter. Final report. Slawson, T.R. (Army Engineer Waterways Experiment Station, Vicksburg, MS (USA). Structures Lab.). Apr 1987. 124p. (WES/TR/SL—87-10). NTIS, PC A06/MF A01.

The 100-man keyworker blast shelter that survived MINOR SCALE (a high explosive event) was retested using the High Explosive Simulation Technique (HEST) in August 1986. The test was conducted at White Sands Missile Range, N. Mex. The existing structure sustained minor damage (1/8-inch permanent midspan deflection) during MINOR SCALE at the predicted 75-psi peak overpressure level, and a retest was proposed to investigate the shelter's large deformation behavior. The shelter was tested using a 1-MT nuclear weapon simulation at 130- to 16-psi (depending on the duration of the simulation). The shelter survived the test with large plastic roof deformations ranging from 8 to 17 inches at roof midspan. The failure mode of the shelter roof was very ductile, and the shelter had adequate reserve capacity to withstand large deformations without catastrophic failure. Survivability of occupants and mechanical equipment at this overpressure was investigated. The mechanical equipment inside the shelter was fully functional after the test except for the roof-mounted fluorescent-light fixtures. Instructure shock was within acceptable limits for shelter occupants, and high-speed movies of the mannequin movement reinforced this conclusion. Based on this test result, it is concluded that the shelter performed as designed in the buried configuration under ideal backfill conditions. Additional scale-model tests validated the shelter design in the bermed configuration and in various backfill types.

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In the Corporate Author Index, report literature is indexed using the name of the organization or institution responsible for issuing the report. Headings are provided for all report literature and for published literature for which a corporate approach is especially desirable, e.g., symposium and conference proceedings.

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Aerojet Energy Conversion Co., Rancho Cordova, CA (USA)
Fluidized bed waste heat recovery system: Program final summary, September 22, 1981-November 30, 1986, 12:47671 (R;US)

Aerospace Corp., El Segundo, CA (USA). Chemistry and Physics Lab.
EPR (electron paramagnetic resonance) studies of defects and impurities in boron-implanted Hg/sub 1-x/Cd/sub x/Te. Technical report, 12:47884 (R;US)
Studies of boron implantation through photochemically deposited SiO_2 films on Hg/sub 1-x/Cd/sub x/Te. Technical report, 12:47885 (R;US)

Aguila Corp., Pepperell, MA (USA)
R and D on a fertilizer sensor and control system: Phase 1 report, 12:47672 (R;US)

Air Force Aerospace Medical Research Lab., Wright-Patterson AFB, OH (USA)
Effect of 2,3,4-trimethylpentane on the ultrastructure of kidneys from normal versus castrated male rats, 12:48522 (R;US)

Air Force Ballistic Missile Office, Norton AFB, CA (USA)
Environmental impact statement: small intercontinental ballistic missile program, Malmstrom Air Force Base, Montana. Draft report, 12:47580 (R;US)

Air Force Engineering and Services Center, Tyndall AFB, FL (USA)
Hydrogen chloride measurements in launch-vehicle exhaust clouds, 12:48291 (R;US)

Air Force Geophysics Lab., Hanscom AFB, MA (USA)
Determination of ionospheric electron-density profiles from satellite uv (ultraviolet) emission measurements, 12:48691 (R;US)

Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering
Computer modeling of high-voltage solar array experiment using the NASCAP/LEO (NASA Charging Analyzer Program/Low Earth Orbit) computer code. Master's thesis, 12:47298 (R;US)
Liquid-droplet radiator in space: a parametric approach. Master's thesis, 12:47630 (R;US)
Stochastic adaptive particle-beam tracker using Meer-filter feedback. Master's thesis, 12:48179 (R;US)

Air Force Occupational and Environmental Health Lab., Brooks AFB, TX (USA)
Waste-water characterization and hazardous-waste survey, Castle AFB, California. Final report, 22-27 September 1986, 12:48423 (R;US)

Air Force Wright Aeronautical Labs., Wright-Patterson AFB, OH (USA)
Study of bipolar nickel-cadmium batteries as pulsed load filters. Final report, January-November 1985, 12:47563 (R;US)

Air Products and Chemicals, Inc., Allentown, PA (USA)
Development and process evaluation of improved Fischer-Tropsch slurry catalysts: Quarterly technical progress report for the period 1 January to 31 March 1987, 12:47260 (R;US)

Alabama Univ., Huntsville (USA). Center for High Technology Management and Economic Research
General-service electric and gas rates for the residential and commercial sectors: 1986. Topical report, 12:47607 (R;US)
Survey of electric utility ratebooks in 120 cities, 1984. Topical report, 12:47606 (R;US)

Allied Corp., Kansas City, MO (USA). Bendix Kansas City Div.
High-performance liquid chromatography methods for characterization of a plating bath brightener additive: Final report, 12:47934 (R;US)
Power ratio/attenuation dc substitution measurement uncertainty with a modified Hewlett Packard 432A Power Meter and 478A thermistor mount, 12:48277 (R;US)
Quad RF power meter, 12:48276 (R;US)

American Chemical Society, Washington, DC
Biogeochemical studies of crude oil stored in the United States' strategic petroleum reserve, 12:47166 (BA;US)
Capillary supercritical fluid chromatography (SFC) and SFC/MS, 12:47946 (BA;US)
Double cross polarization (DCP)/MAS NMR of coal derivatives: a view of the reaction center using a cross polarization filter, 12:47053 (BA;US)
Geoporphyrin structure determination using MS/MS, 12:48016 (BA;US)
Gulf coast salt domes and the strategic petroleum reserve, 12:47165 (BA;US)
High temperature solid state CP-MAS-NMR of bituminous coals, 12:47051 (BA;US)
Solid ^{13}C-NMR relaxation study of coals, 12:47052 (BA;US)
Tandem mass spectrometric analyses of geoporphyrins isolated from oil shale kerogen, 12:47186 (BA;US)

American Coll. of Nuclear Physicians, Washington, DC
Characteristics of medically related low-level radioactive waste, 12:48467 (R;US)
Low-level radioactive wastes resulting from medical activities: A nontechnical guide, 12:48466 (R;US)

American Gas Association Labs., Cleveland, OH
Development of a pulse-combustion space heater. Final report, March 1982-April 1987, 12:47653 (R;US)

American Univ., Washington, DC
Experimental studies of electromagnetic properties of few body systems, 12:48770 (R;US)

AN SSSR, Moscow. Fizicheskij Inst.
Experimental and theoretical physics. Collection, 12:48996 (R;SU;In Russian)
Experimental and theoretical physics. Collection, 12:49054 (R;SU;In Russian)
Experimental and theoretical physics. Collection, 12:48546 (R;SU;In Russian)
Experimental and theoretical physics. Collection, 12:48910 (R;SU;In Russian)
Plasma physics. Collection, 12:48547 (R;SU;In Russian)
Quantum radiophysics. Collection, 12:49055 (R;SU;In Russian)
Quantum radiophysics. Collection, 12:47805 (R;SU;In Russian)

AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.
Carbon photodisintegration with nucleon pair production in intermediate energy range, 12:48881 (R;SU;In Russian)
Deuteron inelastic scattering by electrons in rest, $d+e^- \rightarrow e^- + eta + p$, 12:48948 (R;SU;In Russian)
Development of corpuscular-optical method for electric field measurement, 12:49087 (R;SU;In Russian)

Effect of electrostatic field on behaviour of peripheric plasma at high-frequency heating, 12:49086 (R;SU;In Russian)
Electroproduction of neutral pions on deuterons, 12:48824 (R;SU;In Russian)
Heavy ion accelerator (UTI-2), 12:48175 (R;SU;In Russian)
Helium thermodesorption from Ni polycrystalline samples irradiated by He^+-ions up to $1x10^{17}$-$1x10^{18}$ ion/cm^2 doses, 12:47823 (R;SU;In Russian)
Production of atom flows at materials evaporation by laser radiation, 12:49085 (R;SU;In Russian)

AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst. Nizkikh Temperatur
Ultralow-temperature physics. Bibliography index with abstracts, 12:48097 (R;SU;In Russian)

Argonne National Lab., IL (USA)
Chemical Technology Division annual technical report, 1986, 12:47932 (R;US)
Energy from municipal waste: opportunities for the Southwest, 12:47608 (R;US)
Migration in alluvium of chlorine-36 and tritium from an underground nuclear test, 12:48404 (R;US)
Physics Division annual review, 1 April 1986-31 March 1987, 12:48900 (R;US)
Proceedings of the workshop on opportunities for atomic physics using slow, highly-charged ions, 12:48701 (R;US)
The Argonne Materials Order System, 12:49156 (R;US)
TIBER II/ETR: Nuclear Performance Analysis Group Report, 12:49056 (R;US)
Two-dimensional modeling of fossil-fueled power plant behavior when using CO_2-O_2 or CO_2-H_2O-O_2 mixtures, instead of air, to support combustion, 12:47054 (R;US)

Arinc Research Corp., Annapolis, MD (USA)
Reliability analysis of a fault-tolerant gas turbine control system: Final report, 12:47341 (R;US)

Arizona State Univ., Tempe (USA). Dept. of Electrical and Computer Engineering
Progress toward a crystal streak camera using tungsten bronze crystals for the electrooptic material, 12:48292 (R;US)

Arkansas Univ., Fayetteville (USA). Dept. of Mathematical Sciences
Models and statistical methods for gaseous-emission testing of finite sources in well-mixed chambers, 12:48367 (R;US)

Armed Forces Radiobiology Research Inst., Bethesda, MD (USA)
AFFRI (Armed Forces Radiobiology Research Institute) reports, January, February, March 1987. Technical report, 12:48494 (R;US)

Army Construction Engineering Research Lab., Champaign, IL (USA)
Managing underground-storage-tank data using dBASE III plus. Final report, 12:47588 (R;US)

Army Electronics Technology and Devices Lab., Fort Monmouth, NJ (USA)
Hydrogen annealing of P/sub b/ and E' defect centers in oxidized silicon wafers, 12:47886 (R;US)

Army Engineer Waterways Experiment Station, Vicksburg, MS (USA). Structures Lab.
Vulnerability evaluation of the keyworker blast shelter. Final report, 12:49229 (R;US)

Army Military Personnel Center, Alexandria, VA (USA)
Design and specification of PDL: the prototype dataflow language. Final report, 12:49163 (R;US)

Army Natick Research Development and Engineering Center, MA (USA)
Development of a liquid isotonic ration for consumption in an NBC (nuclear, biological, or chemical) environment. Final report, August 1982-September 1983, 12:47796 (R;US)

Army War Coll., Carlisle Barracks, PA (USA)
Combating terrorism - a response in kind. Student essay, 12:47800 (R;US)
Nuclear winter: the continuing debate. Student essay, 12:48302 (R;US)

Association Euratom-CEA, Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Dept. de Recherches sur la Fusion Controlee
Cross effects on electron-cyclotron and lower-hybrid current drive in tokamak plasmas, 12:49064 (R;FR)
General approach to the computation of local transport coefficients with finite Larmor effects in the collision contribution, 12:49063 (R;FR)
Hyperfrequency reflectometry for determination of electron density and its fluctuations on Petula-B tokamak, 12:49065 (R;FR;In French)
Kinetic equation for a magnetized plasma, 12:49062 (R;FR)
Mode attenuation in overdimensioned circular waveguides for millimeter and submillimeter waves - comparison of principal modes in different types of guides, 12:49130 (R;FR;In French)

Auburn Univ., AL (USA)
The effect of strain rate on the yield behavior of iron-base LRO alloys at elevated temperatures, 12:47815 (R;US)
[Theoretical atomic physics for fusion]: 1986 annual [progress] report, 12:48714 (R;US)

Australian Agricultural Council, Canberra. Standing Committee on Agriculture
Energy conservation and the provision of optimum-temperature conditions for intensive livestock. Technical report series, 12:47702 (R;AU)

Avco Research Lab., Inc., Everett, MA (USA)
MHD [magnetohydrodynamics] channel development: Quarterly report for October 1986-December 1986, 12:47611 (R;US)

B

Battelle Columbus Div., OH (USA)
Effect of water quality on residential-water-heater life-cycle efficiency. Final technical report, September 1985-December 1986, 12:47652 (R;US)

Battelle Columbus Labs., OH (USA)
Characterization of failed solid-dielectric cables: Phase 2, Final report, 12:47366 (R;US)

Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation
Draft Underground Test Plan for site characterization and testing in an exploratory shaft facility in salt, 12:47207 (R;US)
Quarterly brine migration data report, January-March 1985: Nuclear waste repository simulation experiments (brine migration), Asse Mine of the Federal Republic of Germany, 12:47208 (R;US)

BDM Corp., Austin, TX (USA)
Technology survey for a robot which will investigate the condition of underground pipe. Topical report, June-September 1986, 12:47176 (R;US)

Bechtel North American Power Corp., Gaithersburg, MD (USA)
Projected Standard on neutron skyshine, 12:47199 (R;US)

Berger (Louis) and Associates, Inc., Anchorage, AK (USA)
Unimak Pass vessel analysis. Social and economic studies program technical report number 108. Final report, 12:47161 (R;US)

Bettis Atomic Power Lab., West Mifflin, PA (USA)
Light Water Breeder Reactor (LWBR) flow coefficient of reactivity: (LWBR Development Program), 12:47535 (R;US)

Bhabha Atomic Research Centre, Bombay (India)
Bhabha Atomic Research Centre (BARC) annual report 1985-1986, 12:49158 (R;IN)

BOC Cryoplants, Murray Hill, NJ (USA)
Oxygen plants for coal gasification: Experience at the Cool Water GCC [gasification combined cycle] Power Plant: Final report, 12:47024 (R;US)

Bochum Univ. (Germany, F.R.). Abt. fuer Maschinenbau
Investigations of leakage behaviour of big containers and devices, 12:48096 (R;DE;In German)

Bonneville Power Administration, Portland, OR (USA)
Turning over new ground: An impact evaluation of an irrigated agriculture program, 12:47704 (R;US)

Booz, Allen and Hamilton, Inc., Bethesda, MD (USA)
ROD (Record of Decision) annual report, FY 1986, 12:48417 (R;US)

Boston Coll., Chestnut Hill, MA (USA). Dept. of Physics
Neutral-beam-propagation effects in the upper atmosphere. 2. Technical report, 12:48972 (R;US)

Brigham Young Univ., Provo, UT (USA). Dept. of Chemistry
Characterization of coal macerals by high-resolution supercritical fluid chromatography. Annual report, May 1986-April 1987, 12:47043 (R;US)
Supercritical fluid chromatography/supersonic jet spectroscopy: Progress report, 6/1/87-8/31/87, 12:47935 (R;US)

British Coal, London (UK)
Computer-based monitoring and remote control of methane drainage systems, 12:47089 (R;XE)
Extended operation of the liquid solvent extraction process, 12:47028 (R;XE)
Field evaluation of automatic horizon control of ranging drum shearers, 12:47087 (R;XE)
Integrated system for automatic control of face alignment and advance, 12:47088 (R;XE)
Investigation of yield zone development around longwall coal-faces, 12:47083 (R;XE)
Research into fibre-optic data transmission, 12:47078 (R;XE)
Underground use of power semi-conductor devices to control AC motors, 12:47073 (R;XE)
British Coal Opencast Executive, Mansfield
Opencast coal mining in Great Britain, 12:47070 (R;GB)
British Coal, Stanhope Bretby. HQ Technical Dept.
Effects of high-pressure water jets on the performance of boom-type tunnelling machines, 12:47076 (R;XE)
Performance testing of proprietary coal cleaning equipment, 12:47011 (R;XE)
British Steel Corp., London
Blast furnace coal injection at minimum cost, 12:47104 (R;XE)
Brookhaven National Lab., Upton, NY (USA)
Compilation and analysis of air quality data in support of acid deposition research: Progress report, 12:48313 (R;US)
Hydrogen annealing of P/sub b/ and E' defect centers in oxidized silicon wafers, 12:47886 (R;US)
Impact of urban and industrial emissions on mesoscale precipitation quality, 12:48363 (R;US)
Increased statistics in $\pi p p \rightarrow$ phi phi n and the status of glueball production, 12:48747 (R;US)
Low energy antiproton possibilities at BNL, 12:48170 (R;US)
Magnetic correlations and heavy fermion systems, 12:49007 (R;US)
Modelling and theories of alloy phase behavior, 12:47808 (R;US)
Neutrinos in supernovae, 12:48552 (R;US)
Neutron capture studies on ^{189}Os, 12:48888 (R;US)
Neutron diffraction analysis of $HRh[P(C_6H_5)_3]_4$, 12:47887 (R;US)
Proceedings of the 1986 summer workshop on antiproton beams in the 2-10 GeV/c range, 12:48171 (R;US)
Proceedings of the ICFA [International Committee for Future Accelerators] workshop on low emittance e^- -e^+ beams, 12:48180 (R;US)
Relativisitic heavy ion collisions, 12:48896 (R;US)
Report of the workshop on transferring X-ray Lithography Synchrotron (XLS) technology to industry, 12:48172 (R;US)
Short-pulse high-current-density photoemission in high electric fields, 12:48199 (R;US)
Stratospheric particles: Synchrotron x-ray fluorescence determination of trace element contents, 12:48551 (R;US)
Structure-property relationships for RBa2Cu3/O/sub x/ phases, 12:47855 (R;US)
Tapping the earth's geothermal resources: Hydrothermal today, magma tomorrow, 12:47335 (R;US)
The interdependence of parameters for TeV linear colliders, 12:48176 (R;US)
US-Japan Cooperative Program on neutron scattering, 12:48973 (R;US)
Brown Univ., Providence, RI (USA)
Data acquisition and filtering, subgroups B (models) and C (software): Summary of Working Group 5, 12:48200 (R;US)
Modelling microprocessor farms for SSC [Superconducting Super Collider] data acquisition, 12:48201 (R;US)
The MicroVAX-based data acquisition system for D0, 12:48230 (R;US)
Brown Univ., Providence, RI (USA). Dept. of Physics
Nuclear excitations and reaction mechanisms: Progress report: [1 August 1986-31 July 1987], 12:48904 (R;US)
Brown Univ., Providence, RI (USA). Div. of Engineering
Method for dynamic fracture initiation testing of ceramics, 12:47854 (R;US)
Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)
Investigation of the degradation rate of selected reference chemicals in the troposphere. Final report, 12:48333 (R;DE;In German)
Bureau of Mines, Pittsburgh, PA (USA). Pittsburgh Research Center
Analysis of rock chips produced during water-jet-assisted cutting. Report of Investigations/1987, 12:47097 (R;US)
Clay veins: their occurrence, characteristics, and support. Report of Investigations/1987, 12:47095 (R;US)
Guidelines for dust control in small underground coal mines. Handbook, 12:47096 (R;US)
Methane contents of oil shale from the Piceance Basin, Colorado. Report of investigations/1987, 12:47185 (R;US)
Bureau of Mines, Tuscaloosa, AL (USA). Tuscaloosa Research Center
Fine grinding of coal by the turbomilling process. Report of Investigations/1987, 12:47012 (R;US)
Bureau of Mines, Twin Cities, MN (USA). Twin Cities Research Center
Mined-land subsidence impacts on farmland with potential application to Illinois: a literature review. Information Circular/1987, 12:47067 (R;US)
Bureau of Reclamation, Denver, CO (USA). Engineering and Research Center
PMF (probable maximum flood) study for Nevada Nuclear Waste Storage Investigation Project, 12:47210 (R;US)

C

California Birth Defects Monitoring Program, Berkeley (USA)
Illustrations of a density-equalizing map projection technique, 12:48491 (R;US)
California Inst. of Tech., Pasadena (USA)
The Mark III vertex chamber, 12:48267 (R;US)
California State Air Resources Board, Sacramento (USA). Stationary Source Div.
Evaluation of combustion processes for destruction of liquid organic wastes, GA Technologies, Incorporated, 12:48347 (R;US)
Evaluation test on a landfill gas-fired turbine at the Los Angeles County Sanitation District's Puente Hill Landfill Electric Generation Station. Air pollution test report, 12:47351 (R;US)
California State Dept. of Fish and Game, Long Beach (USA). Marine Resources Div.
Deepwater demersal fishes observed from the submersible AVALON (DSRV-2) off the Farallon Islands, 24 June 1985. Technical report (Final), 12:47228 (R;US)
California Univ., Berkeley (USA). Dept. of Biostatistics
Illustrations of a density-equalizing map projection technique, 12:48491 (R;US)
California Univ., Los Angeles (USA). Dept. of Mechanical, Aerospace and Nuclear Engineering
Measurement of parallel ion energy distribution function in PISCES plasma, 12:49104 (R;US)
California Univ., San Diego, La Jolla (USA)
Coal gasification: Direct applications and syntheses of chemicals and fuels: A research needs assessment, 12:47014 (R;US)
California Univ., San Diego, La Jolla (USA). Center for Astrophysics and Space Sciences
HELIOS photometer measurement of in-situ density enhancements, 12:48549 (R;US)
California Univ., San Diego, La Jolla (USA). Dept. of Applied Mechanics and Engineering Sciences
Point vortex dynamics: Recent results and open problems, 12:48738 (R;US)
California Univ., San Diego, La Jolla (USA). Inst. of Pure and Applied Physical Sciences
Shock-induced melting and rapid solidification, 12:47842 (R;US)
California Univ., San Diego (USA)
Metric type-III burst asymmetry relative to simple bipolar active regions, 12:48550 (R;US)
California Univ., Santa Barbara (USA). Marine Science Inst.
The ecology of Mugu Lagoon, California: An estuarine profile, 12:48421 (R;US)
California Univ., Santa Cruz (USA)
The Mark III vertex chamber, 12:48267 (R;US)
Cambridge Systematics, Inc., Berkeley, CA (USA)
Models of commercial sector equipment and fuel decisions for the COMMEND code: Framework design and data development plan: Final report, 12:47605 (R;US)
CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)
Gastrointestinal transfer of neptunium (V) in newborn baboons: preliminary results, 12:48496 (R;FR)

CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-lez-Durance (France). Service de Radio-Agronomie
Effect of irradiation and exposure to nitrogen on the mortality of adults. Tribolium confusum J. du V, 12:48492 (R;FR)
Point of view about identification of irradiated foods by electron spin resonance, 12:48493 (R;FR)
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Analyse de Surete
Comparative analysis of accelerogram processing methods, 12:48538 (R;FR;In French)
Comparison of European computer codes relative to the aerosol behavior in PWR containment buildings during severe core damage accidents, 12:47446 (R;FR)
General seismology and seismogenesis. Near field seismic movement studies, 12:48540 (R;FR;In French)
Motivation of parametric studies. French recommendations concerning surveillance in exploitation. Program of steam generator inspection, 12:47463 (R;FR;In French)
Operating reliability of valves in French pressurized water nuclear power plants, 12:47410 (R;FR)
Qualification of class 1e equipment: regulation, technological margins and test experience, 12:47462 (R;FR;In French and English)
Scenario of the accident of Chernobyl. Technical aspects and safety, 12:47465 (R;FR;In French)
Some important points of the French safety approach, 12:47464 (R;FR;In French)
State of the art in the calculation of a reference motion for design purposes. Modification of bedrock motion by superficial, young deposit, 12:48092 (R;FR)
Strong movement data currently available at IPSN/DAS, 12:48539 (R;FR;In French)
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. de Genie Radioactif
Behavior of fluoride glass optical fibers under gamma irradiation, 12:47889 (R;FR;In French)
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Inst. de Recherche Technologique et de Developpement Industriel (IRDI)
Analogue studies at the French Atomic Commission (CEA), 12:47209 (R;FR)
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Section d'Etude de la Corrosion Aqueuse
Intergranular corrosion mechanisms of alloy 600: Final report, 12:47434 (R;US)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Physico-Chimie
Influence of ion implantation and gas exposure on the charge in SiO2 created by electronic excitation, 12:47888 (R;FR)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Physique des Particules Elementaires
Study of the production of muon pairs at the Petra e/sup +/e/ sup -/ collider: measurements of the cross section and of the electroweak asymmetry, 12:48748 (R;FR;In French)
Survey of research in elementary particle physics, 12:48774 (R;FR;In French)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Technologie
Point defects and atomic diffusion in metallic glasses, 12:47809 (R;FR)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Inst. de Recherche Fondamentale (IRF)
Excited nuclei fragmentation, 12:48901 (R;FR;In French)
High energy galaxy, 12:48553 (R;FR)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Inst. de Recherche Technologique et de Developpement Industriel (IRDI)
Review of analysis methods to prevent thermal buckling, 12:47433 (R;FR;In French)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service de Physique Nucleaire a Basse Energie
Perspectives in heavy ion physics with the Saclay booster, 12:48173 (R;FR)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service de Physique Nucleaire a Moyenne Energie
Diogene: synthesis and perspectives, 12:48229 (R;FR;In French)
Cekmece Nuclear Research and Training Center, Istanbul (Turkey)
One dimensional benchmark calculations using diffusion theory, 12:47432 (R;TR;In Turkish)
Center for Social and Economic Issues, Ann Arbor, MI (USA)
Implementing and managing change: A guide for assessing information technology, 12:49228 (R;US)
Central Electricity Research Labs., Leatherhead (UK)
Development of an HCl laser system to measure plume HCl concentrations, 12:48314 (R;GB)
Centre de Pyrolyse de Marienau (France)
Heating technique in coal carbonization processes - material balances for the coking process, 12:47026 (R;XE;In French)
Centre d'Etudes et Recherches des Charbonnages de France (CERCHAR), Verneuil-en-Halatte
Integrated manriding, 12:47090 (R;XE;In French)
Rock cutting by means of picks assisted by high-pressure water jets, 12:47075 (R;XE;In French)
Centro Sperimentale Metallurgico, Rome (Italy)
Comparison between the behaviour of conventional or pretreated blends in large-scale coking ovens, 12:47027 (R;XE;In Italian)
Influence of radial distribution of burden in blast furnaces on the radial pattern of reduction of pig iron elements: experimental investigation using laboratory techniques, 12:47037 (R;XE;In Italian)
Ceskoslovenska Vedeckotechnicka Spolecnost, Prague
Collection of lectures delivered at decontamination course, 12:47215 (R;CS;In Czech)
Chicago Univ., IL (USA)
Fundamentals and techniques of nonimaging optics research: Final report, 12:48093 (R;US)
Limits of thermochemical and photochemical syntheses of gaseous fuels: a finite-time thermodynamic analysis. Annual report, January-December 1985, 12:47262 (R;US)
Christian Michelsens Inst. for Vitenskap og Aandsfrihet, Bergen (Norway)
Aggregation and disaggregation in integer programming problems, 12:49169 (R;NO)
Alternative petroleum taxation systems. Comparisons under uncertainty, 12:47148 (R;NO)
Investment appraisal in reservoir economics, 12:47146 (R;NO)
Petroleum field optimization. Comments on models and solution techniques, 12:47132 (R;NO)
Retrospective simulation of oil demand and crude oil production. A basis for crude oil prices scenarios, 12:47145 (R;NO)
Some aspects of tax progressivity in natural resources taxation, 12:47147 (R;NO)
Strong cutting plane algorithm for an assignment problem with side constraints, 12:49170 (R;NO)
Weak form efficiency of the International Petroleum Exchange, 12:47144 (R;NO)
Western European natural gas market. Effects of import diversification constraints, 12:47169 (R;NO)
City Coll., New York (USA)
Increased statistics in $\pi^- p \rightarrow$ phi phi n and the status of glueball production, 12:48747 (R;US)
Clemson Univ., SC (USA)
The sensitivity index as a screening tooling in the uncertainty analysis of ground-water contaminant transport, 12:47214 (R;US)
Coal Tech Corp., Merion, PA (USA)
Design, fabrication and testing of an advanced cyclone coal combustor of an industrial boiler, using coal slurries as a fuel: Phase 2, Combustor installation and test: Final report, June 3, 1985 to June 15, 1987, 12:48154 (R;US)
Colorado State Univ., Fort Collins (USA)
Radiation injury to the canine thymus lymphohematopoietic stem cells - correlation with functional deficits. Technical report, 22 February 1984-30 November 1985, 12:48495 (R;US)
Study of improved methods for predicting chemical equilibria: Technical progress report for the period July 1, 1986 to September 1, 1987, 12:47947 (R;US)
Colorado State Univ., Fort Collins (USA). Dept. of Chemistry
Chemically modified electrodes and related solution chemistry: Technical progress report for the period 1/15/87 to 9/10/87, 12:47890 (R;US)
Colorado State Univ., Fort Collins (USA). Dept. of Physics
Effects of impurities on domain growth, 12:47899 (R;US)
Columbia Univ., New York (USA)
International symposium on observation of the continental crust through drilling: Summary, 12:48545 (R;US)

Columbia Univ., Palisades, NY (USA). Lamont-Doherty Geological Observatory
Coral growth rings and the temporal history of nuclear $^{14}C/C$ and $^{90}Sr/Sr$ in the surface ocean: Final report, June 1, 1982-December 31, 1984, 12:48438 (R;US)
Commission of the European Communities, Brussels (Belgium)
Air quality standard for SO_2 and particles (Directive 80-779-EEC) and its significance for the other main air pollutants, 12:48320 (R;XE)
Commission of the European Communities, Geel (Belgium). Central Bureau for Nuclear Measurements
Software for a measuring facility for activation analysis, 12:48231 (R;FR)
Commission of the European Communities, Ispra (Italy). Joint Research Centre
About properties of point defects in metals, 12:47817 (R;FR)
Mixing and mass transfer in bubble extractor: its application to tritium extraction from 17Li83Pb, 12:49129 (R;FR)
Commission of the European Communities, Luxembourg
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Calibration and experimental comparison of the active well coincidence counter and PHONID-II, 12:47243 (R;FR)
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Mixing and mass transfer in bubble extractor: its application to tritium extraction from 17Li83Pb, 12:49129 (R;FR)
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Consiglio Nazionale delle Ricerche, Trento (Italy)
Enhanced diffusion processes during heavy-ion irradiation of glasses, 12:47911 (R;US)
Cornell Univ., Ithaca, NY (USA)
Field-reversing electron and ion rings for the confinement and heating of plasmas: Annual progress report for the period September 1, 1986-August 31, 1987, 12:49059 (R;US)
Cornell Univ., Ithaca, NY (USA). Geotechnial Engineering Group
Review of load tests on deep foundations subjected to repeated loading: Final report, 12:47365 (R;US)
Council for Mineral Technology, Randburg (South Africa)
Direct reduction of hematite fines with coal in a fluidized bed, 12:47106 (R;ZA)
Council for Scientific and Industrial Research, Pretoria (South Africa). National Building Research Inst.
Hot-water use in low-income households and the ability of integral solar water heaters to accommodate these requirements. Special report, 12:47648 (R;ZA)

D

Danmarks Tekniske Hoejskole, Lyngby. Lab. for Varmeisolering
Investigation of passive solar walls by means of an indoor test facility, 12:47319 (R;DK;In Danish)
Daresbury Lab. (UK)
Neutron capture studies on ^{189}Os, 12:48888 (R;US)
Dartmouth Coll., Hanover, NH (USA). Thayer School of Engineering
PWR [pressurized water reactor] pressurizer transient response: Final report, 12:47469 (R;US)
David W. Taylor Naval Ship Research and Development Center, Annapolis, MD (USA). Ship Materials Engineering Dept.
High-temperature hot-corrosion control by fuel additives (contaminated fuels). Final report, October 1985-December 1986, 12:47140 (R;US)
Defence Research Establishment Atlantic, Dartmouth, Nova Scotia (Canada)
Development of a small-scale test apparatus for the evaluation of thermal-barrier materials. Technical communications report, 12:47881 (R;CA)
Delaware Univ., Newark (USA). Center for Catalytic Science and Technology
Trifunctional catalysts for conversion of syngas to alcohols: Twelfth quarterly report for period June 1, 1987 to August 31, 1987, 12:47266 (R;US)
Denver Univ., CO (USA). Dept. of Engineering
Characterization and fundamental studies on CuO sorbent materials to determine attrition mechanisms on substrate gamma alumina: Technical progress report number 2 for the period December 23, 1986 to March 23, 1987, 12:47356 (R;US)
Department of Energy, London (UK)
Proceedings of an international workshop on straw as fuel, 12:47267 (R;GB)
Department of Energy, Washington, DC (USA)
Electricity and short wavelength radiation generator, 12:47631 (P;GB)
Deutsche Gesellschaft fuer Wiederaufarbeitung von Kernbrennstoffen m.b.H. (DWK), Hannover (Germany, F.R.)
Pros and cons of a nuclear phaseout, 12:47593 (R;DE;In German)
Dugway Proving Ground, UT (USA)
Migration of hazardous substances through soil. Part 3. Flue-gas desulfurization and fly-ash wastes. Final report, December 1974-July 1977, 12:48403 (R;US)
Duisburg Univ. (Gesamthochschule) (Germany, F.R.). Fachoereich Maschinenbau
Contribution to the representation of circumferential flow instabilities and feed disturbances in axial compressors, 12:48130 (R;DE;In German)
Duke Univ., Durham, NC (USA)
Triangle Universities Nuclear Laboratory: Annual report, TUNL XXVI, 1 September 1986-31 August 1987, 12:48865 (R;US)
Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant
Automated office support systems Savannah River Plant site summary, 12:49226 (R;US)
[South Carolina Department of Health and Environmental Control] SCDHEC permit procedures "HOW" manual, 12:48411 (R;US)
Du Pont de Nemours (E.I.) and Co., Wilmington, DE (USA). Central Research and Development Dept.
Structure-property relationships for $RBa_2Cu_3/O/sub\ x/$ phases, 12:47855 (R;US)

E

EG and G Idaho, Inc., Idaho Falls (USA)
Davis-Besse uncertainty study, 12:47533 (R;US)
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Diffraction moire: The dynamic regime, 12:47897 (R;US)
DOE Small-Scale Hydropower Program: Annual report 1987, 12:47275 (R;US)
The microcomputer as an engineering management tool, 12:48091 (R;US)
Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland)
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Electric Power Research Inst., Palo Alto, CA (USA)
Characterization of failed solid-dielectric cables: Phase 2, Final report, 12:47366 (R;US)
ChemCoal Process Development Program: Final report, 12:47023 (R;US)
Chemical characterization of fossil fuel combustion wastes: Final report, 12:47055 (R;US)
Compensatory mechanisms in fish populations: An EPRI research plan: Final report, 12:48441 (R;US)
EPRI Nondestructive Evaluation Center: 1986 annual report, 12:47470 (R;US)
Erosion resistant coatings for steam turbines: Final report, 12:47342 (R;US)

Extending applications of the transient energy function method: Final report, 12:47343 (R;US)
Finite element simulation and automated defect detection for thyristors: Final report, 12:47364 (R;US)
Intergranular corrosion mechanisms of alloy 600: Final report, 12:47434 (R;US)
Laboratory protocol to demonstrate equivalency for plant wastewater cotreatment: Final report, 12:47358 (R;US)
Models of commercial sector equipment and fuel decisions for the COMMEND code: Framework design and data development plan: Final report, 12:47605 (R;US)
NO/sub x/ reduction for small gas turbine power plants: Final report, 12:47357 (R;US)
Optical power line voltage and current measurement systems: Volume 2, Assessment of future optical measurements of voltage and current in electric power systems: Final report, 12:47367 (R;US)
Oxygen plants for coal gasification: Experience at the Cool Water GCC [gasification combined cycle] Power Plant: Final report, 12:47024 (R;US)
PWR [pressurized water reactor] pressurizer transient response: Final report, 12:47469 (R;US)
Reliability analysis of a fault-tolerant gas turbine control system: Final report, 12:47341 (R;US)
Residual and applied stress analysis of an alloy 600 row 1 U-bend: Final report, 12:47416 (R;US)
Retrofit FGD [Flue Gas Desulfurization] cost estimating guidelines: Computer user's manual, 12:47359 (R;US)
Review of load tests on deep foundations subjected to repeated loading: Final report, 12:47365 (R;US)
Sampling guidelines for groundwater quality: Final report, 12:48425 (R;US)
Turbine protection system evaluation: Final report, 12:47435 (R;US)
Upgrading Upper Kittanning Seam coal quality to improve power plant performance: Coal cleaning test facility campaign report No. 6, 12:47025 (R;US)
User's guide for signal validation software: Final report, 12:47443 (R;US)

Energiforskningsnaemnden, Stockholm (Sweden)
Adaptive capacity of energy systems. Risks of long-range engagements. Method of analysis and results, 12:47575 (R;SE;In Swedish)

Energistyrelsen, Copenhagen (Denmark)
Exploration. Guidelines for drilling, 12:47162 (R;DK;In Danish and English)

EnerGroup, Inc., Portland, ME (USA)
Investigation of the energy value of automobile shredder residue, 12:47673 (R;US)

Energy and Environmental Analysis, Inc., Arlington, VA (USA)
Competitive position of natural gas: high-temperature fluid heating in petroleum refining and chemicals manufacturing. Topical report, 12:47171 (R;US)

Energy and Environmental Research Corp., Irvine, CA (USA)
Evaluation of utility-boiler radiant furnace residence time/temperature characteristics: field tests and heat-transfer modeling. Final report, October 1982-September 1985, 12:47352 (R;US)
Kinetics of nitrogen and sulfur reactions in combustion systems: Quarterly technical progress report No. 9, 12:47355 (R;US)
Two-dimensional modeling of fossil-fueled power plant behavior when using CO_2-O_2 or CO_2-H_2O-O_2 mixtures, instead of air, to support combustion, 12:47054 (R;US)

Energy Systems Associates, Tustin, CA (USA)
Natural gas/pulverized-coal cofiring performance testing at an electric-utility boiler. Topical report, June-October 1986, 12:47353 (R;US)

Entropy Environmentalists, Inc., Research Triangle Park, NC (USA)
Performance audit procedures for opacity monitors, 12:48356 (R;US)

Environmental Protection Agency, Ann Arbor, MI (USA)
Compilation of air-pollutant-emission factors. Volume 2. Mobile sources (4th edition), 12:48346 (R;US)

Environmental Protection Agency, Duluth, MN (USA). Environmental Research Lab.
Cadmium speciation in aquatic-life flow-through bioassay diluters, 12:48430 (R;US)

Environmental Protection Agency, Las Vegas, NV (USA). Office of Radiation Programs
Estimates of population distributions and tailings areas around licensed uranium mill sites. Final report, 12:47240 (R;US)

Environmental Protection Agency, Research Triangle Park, NC (USA). Atmospheric Sciences Research Lab.
IACP (Integrated Air Cancer Project) emissions: transformations and fate, 12:48358 (R;US)
International Sulfur Deposition Model Evaluation (ISDME), 12:48365 (R;US)
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Turbulent diffusion behind vehicles: experimentally determined turbulence mixing parameters, 12:48355 (R;US)
Wind transport of scalars and pollutants, 12:48335 (R;US)

Environmental Protection Agency, Research Triangle Park, NC (USA). Environmental Sciences Research Lab.
Relationships involving fine-particle mass, fine-particle sulfur, and ozone during episodic periods at sites in and around St. Louis, Missouri, 12:48361 (R;US)

Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.
Protocol for applying and validating the CMB (chemical mass balance) model, 12:48348 (R;US)
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Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards
PM10 SIP (State Implementation Plan) development guideline, 12:48399 (R;US)

Environmental Protection Agency, Washington, DC (USA)
Superfund Record of Decision (EPA Region 4): A. l. Taylor site (Valley of the Drums), Bullitt County, Kentucky, June 1986. Final report, 12:48413 (R;US)
Superfund Record of Decision (EPA Region 1): Auburn Road Landfill, Londonderry, New Jampshire, September 1986. Final report, 12:48416 (R;US)
Superfund Record of Decision (EPA Region 1): Baird and McGuire, Holbrook, Massachusetts, September 1986. Final report, 12:48415 (R;US)
Superfund Record of Decision (EPA Region 3): Bruin Lagoon Site, Bruin Borough, Pennsylvania (second remedial action), September 1986. Final report, 12:48444 (R;US)
Superfund Record of Decision (EPA Region 3): Drake Chemical Site (Phase 2), Lock Haven, Clinton County, Pennsylvania (second remedial action), May 1986. Final report, 12:48445 (R;US)
Superfund Record of Decision (EPA Region 2): Florence Land Recontouring (FLR) landfill, Florence, Mansfield, and Springfield, New Jersey, June 1986. Final report, 12:48412 (R;US)
Superfund Record of Decision (EPA Region 4) Gallaway Ponds Site, Gallaway, Tennessee, September 1986. Final report, 12:48448 (R;US)
Superfund Record of Decision (EPA Region 5): Lake Sandy Jo/M and M landfill, Lake County, Indiana, September 1986. Final report, 12:48414 (R;US)
Superfund Record of Decision (EPA Region 2): Lang Property, Pemberton Township, New Jersey, September 1986. Final report, 12:48447 (R;US)
Superfund Record of Decision (EPA Region 2): Marathon Battery Company site, Cold Spring, Putnam County, New York, September 1986. Final report, 12:48449 (R;US)
Superfund Record of Decision (EPA Region 6): Odessa Chromium 1, Odessa, Texas, September 1986. Final report, 12:48446 (R;US)

Environmental Protection Agency, Washington, DC (USA). Office of Solid Waste and Emergency Response
Permit guidance manual on unsaturated zone monitoring for hazardous-waste land-treatment units. Final report, 12:48418 (R;US)
Study of joint use of vehicles for transportation of hazardous and nonhazardous materials. A report to Congress, 12:47585 (R;US)

ERE Systems Ltd., Arlington, VA (USA)
Barrow Arch transportation-systems impact analysis. Social and economic studies program technical report number 104. Final report, 12:47159 (R;US)

Erevanskij Fizicheskij Inst. (USSR)
Exotic baryon resonances. Modern status. Possibilities to search and investigate, 12:48750 (R;SU)
Investigation of electrons with /sup 6/Li, /sup 9/Be, /sup 12/C, /sup 28/Si nuclei in the region of quasi-elastic peak and δ/sub 33/-resonace, 12:48868 (R;SU;In Russian)

Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Medizinische Fakultaet
Investigations into the oxygen effect during the radiolysis of serum albumin with the help of SDS-polyacrylamide gel electrophoresis, 12:48029 (R;DE;In German)

Essen Univ. (Gesamthochschule) (Germany, F.R.). Fachbereich Energie-, Verfahrens- und Elektrotechnik
Investigation of the design and thermal behaviour of a core catching device for a light water reactor, 12:47473 (R;DE;In German)

Evans, Carey and Crozier, Bakersfield, CA (USA)
Naval Petroleum Reserve No. 2: Buena Vista Oil and Gas Field, Kern County, California: Proved reserves, Developed and undeveloped, Sections 6 and 8: Development history and exploitation techniques, Effective July 1, 1987: [Final technical report], 12:47133 (R;US)

Exxon Research and Engineering Co., Annandale, NJ (USA)
Effects of impurities on domain growth, 12:47899 (R;US)

F

Federal Aviation Administration, Atlantic City, NJ (USA). Technical Center
Laboratory characterization tests for antimisting fuel. Final report, 12:47138 (R;US)

Fermi National Accelerator Lab., Batavia, IL (USA)
Excited quark production at hadron colliders, 12:48827 (R;US)
Modelling microprocessor farms for SSC [Superconducting Super Collider] data acquisition, 12:48201 (R;US)

Finnish Centre for Radiation and Nuclear Safety, Helsinki. Dept. of Nuclear Safety
Operation of Finnish nuclear power plants. 3. Quarterly report 1986, 12:47409 (R;FI)

Florida State Univ., Tallahassee (USA)
Octupole instability in the heavy barium region, 12:48902 (R;US)

Florida State Univ., Tallahassee (USA). Inst. of Molecular Biophysics
Energy transformation in molecular electronic systems: Research progress report for the period December 1, 1986-November 30, 1987, 12:47985 (R;US)

Florida Univ., Gainesville (USA)
US Department of Energy Nuclear Energy University program in robotics for advanced reactors: Program plan, FY 1987-1991, 12:48094 (R;US)

Florida Univ., Gainesville (USA). Dept. of Physics
Coset representation of closed loop space in string field theory, 12:48846 (R;US)
Exotic (E_8) particles in e^+e^- annihilation, 12:48780 (R;US)
Studies of heavy fermion systems: Progress report, July 1, 1986-December 31, 1987, 12:49009 (R;US)

Foersvarets Forskningsanstalt, Stockholm (Sweden)
Adaptive capacity of energy systems. Risks of long-range engagements. Method of analysis and results, 12:47575 (R;SE;In Swedish)

Forest Service, Portland, OR (USA). Pacific Northwest Forest and Range Experiment Station
Reducing losses of nitrogen from duff consumption by prescribed fire in Douglas-fir/western hemlock clearcuts: Final report, 12:48401 (R;US)

Foster-Miller, Inc., Waltham, MA (USA)
Turbine protection system evaluation: Final report, 12:47435 (R;US)

G

General Electric Co., Cincinnati, OH (USA). Aircraft Engine Business Group
Antimisting fuel (AMK) flight degrader development and aircraft-fuel-system investigation. Final report, March 1983-December 1985, 12:47141 (R;US)

General Electric Co., Schenectady, NY (USA). Turbine Technology Lab.
Erosion resistant coatings for steam turbines: Final report, 12:47342 (R;US)

Georgia Inst. of Tech., Atlanta (USA). School of Electrical Engineering
Homeostatic utility controls applied to TVA: Final project report, 12:47354 (R;US)
Two-dimensional signal processing and storage and theory and applications of electromagnetic measurements. Annual report, 1 January-31 February 1986, 12:49165 (R;US)

Georgia Inst. of Tech., Atlanta (USA). School of Geophysical Sciences
Atmospheric nitrogen oxides: their detection and chemistry. Second-year report, August 1, 1984-August 31, 1985, 12:48369 (R;US)

Georgia Inst. of Tech., Atlanta (USA). School of Physics
The structure and reactivity of heterogeneous surfaces and study of the geometry of surface complexes: Progress summary, January 1, 1987-December 31, 1987, 12:48992 (R;US)

Georgia Inst. of Tech., Atlanta (USA). School of Textile Engineering
Application of chemicals to substrates without the use of liquids: Solid-on-solid (SOS) processing: Final technical report, August 1, 1984-July 31, 1986, 12:47670 (R;US)

Georgia Univ., Athens (USA). Dept. of Physics
Excitations during collisionally-induced electron detachment of negative ions. Final report, 1 August 1983-31 December 1986, 12:48699 (R;US)

Georgia Univ., Sapelo Island (USA). Marine Inst.
Environmental research on actinide elements, 12:48408 (R;US)

Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)
Recent findings about the Chernobyl reactor accident. Pt. 1 and 2. Pt. 1: Summary and evaluation of information provided on the plant and the course of the accident. Pt. 2: Radiological repercussions in the Federal Republic of Germany and other European countries. As of October 1986, 12:47471 (R;DE;In German)

Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)
Nucleus-nucleus collisions at relativistic energies: The CERN WA80 experiment, 12:48878 (R;US)

GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)
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GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Physik
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Goettingen Univ. (Germany, F.R.). Inst. fuer Physikalische Chemie
Investigation of the degradation rate of selected reference chemicals in the troposphere. Final report, 12:48333 (R;DE;In German)

Golder Associates, Inc., Lakewood, CO (USA)
Draft Underground Test Plan for site characterization and testing in an exploratory shaft facility in salt, 12:47207 (R;US)

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Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki

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Theoretical group nature of an impact parameter and elastic scattering of hadrons, 12:48784 (R;SU;In Russian)

Graham (Reuben L.), Inc., Charleston, WV (USA)
Exploration-production studies in newly drilled Devonian Shale gas wells. Annual report, February 1, 1986-January 31, 1987, 12:47167 (R;US)

Grand Accelerateur National d'Ions Lourds (GANIL), 14 - Caen (France)
Beam diagnostics at Ganil in 1986, 12:48181 (R;FR)
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Grinnell Coll., IA (USA)
An intensive short-term study of atmospheric lead deposition to a high-elevation spruce forest, 12:48315 (R;US)

Groenlands Tekniske Organisation, Copenhagen (Denmark)
Hydrological hydropower exploration Iterlaa Paamiut/ Frederikshaab. Hydrological dimensioning basis 1985, 12:47273 (R;DK;In Danish)

Gull Associates, Washington, DC (USA)
Proceedings of the symposium on chemical phenomena associated with radioactivity releases during severe nuclear plant accidents, 12:47483 (R;US)

H

Hamburg Univ. (Germany, F.R.). Fachbereich 13 - Chemie
Effects of cadmium on the metabolism of vegetable plants - a study investigating into the effects observed in greenhouses and vegetable fields in the surroundings of Hamburg, 12:48525 (R;DE;In German)

Hanford Engineering Development Lab., Richland, WA (USA)
Effect of loading rate and thermal aging on the fracture toughness of stainless steel alloys, 12:47819 (R;US)
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Some safety considerations of liquid lithium as a fusion breeder material, 12:49132 (R;US)
The examination of an electromagnetic sampling pump from FFTF [Fast Flux Test Facility] primary circuit, 12:47452 (R;US)

Han-Padron Associates, New York (USA)
Beaufort Sea petroleum technology assessment. Social and economic studies program technical report number 112. Final report, 12:47160 (R;US)

Heidelberg Univ. (Germany, F.R.). Naturwissenschaftlich-Mathematische Gesamtfakultaet
Natural isotopic labelling in precipitation and initial formation of groundwater, 12:48420 (R;DE;In German)

Helsedirektoratet, Oslo (Norway)
Radioactive fallout over Norway after the reactor accident in USSR. Radioactivity in foodstuffs 1986, 12:47480 (R;NO;In Norwegian)

Helsinki Univ. of Technology, Otaniemi (Finland). Inst. of Energy Engineering
Development of pressurized fluidized bed combustion. Final report, 12:47111 (R;FI;In Finnish)

Hengel Associates, Rapid City, SD (USA)
Utility emissions software for the NAPAP (National Acid Precipitation Assessment Program) 1985 emissions inventory, 12:48359 (R;US)

Hessisches Sozialministerium, Wiesbaden (Germany, F.R.)
Chernobyl reactor accident and its consequences. 3. Rev. Ed , 12:47474 (R;DE;In German)

Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics
Number count-redshift relation in universe models with nonzero cosmological constant, 12:48686 (R;JP)
On some higher-dimensional spacetimes, 12:49043 (R;JP)
On some propagators of a scalar wave in a (n+1)-dimensional spacetime, 12:48685 (R;JP)
On the gravitational instability in an infinite homogeneous medium, 12:49042 (R;JP)
Some peculiar space-times with spherical symmetry, 12:48841 (R;JP)

Holditch (S.A.) and Associates, Inc., College Station, TX (USA)
Tight gas sands research program: field operations and analysis. Operating GRI's (Gas Research Institute's) mobile testing and control facility. Annual report 1986, 12:47173 (R;US)
Tight-Gas-Sands Research Program: field operations and analysis. Cooperative-well report, Arkla Exploration, T.P. Scott No. 5, Harrison County, Texas, 12:47174 (R;US)

Hydro Geo Chem., Inc., Tucson, AZ (USA)
Migration in alluvium of chlorine-36 and tritium from an underground nuclear test, 12:48404 (R;US)

I

Illinois Univ., Urbana (USA)
The development of ODE methods: A symbiosis between hardware and numerical analysis, 12:49179 (R;US)
The Mark III vertex chamber, 12:48267 (R;US)

Illinois Univ., Urbana (USA). Dept. of Computer Science
Computational methods and software for differential equations and their applications: Annual report, December 1, 1986-November 30, 1987, 12:49177 (R;US)
Parallel methods for ordinary differential equations, 12:49178 (R;US)

Illinois Univ., Urbana (USA). Inst. for Environmental Studies
The atmospheric chemistry of Po-218: Technical report for the period March 1, 1987 to August 31, 1987, 12:48380 (R;US)
Illinois Univ., Urbana (USA). Water Resources Center
Photolytic ozonation for protection and rehabilitation of groundwater resources: a mechanistic study. Research report, 12:48433 (R;US)
Imatran Voima Oy, Helsinki (Finland)
Apartment-specific energy measuring and invoicing system in a multi-storey building with electric heating, 12:47639 (R;FI;In Finnish)
Indian Inst. of Science, Bangalore
Families of Bose rays in quantum optics, 12:49011 (R;US)
In-Situ, Inc., Laramie, WY (USA)
Review of hydrologic testing in coal beds. Topical report, January 1985-December 1986, 12:47172 (R;US)
Institute for Defense Analyses, Alexandria, VA (USA)
Chemical warfare in the Third World. Summary report (Final), 12:47801 (R;US)
Global-effects simulation studies. Interim report (Final), April 1985-November 1986, 12:48301 (R;US)
Institute for Energy Technology, Kjeller (Norway)
Validation of techniques for simulating long range dispersal and deposition of atmospheric pollutants based upon measurements after the Chernobyl accident. Transfrontier atmospheric models (TRANSAM), 12:49157 (R;NO)
Institute of Gas Technology, Chicago, IL (USA)
Conventional research house planning, acquisition, instrumentation, and characterization tests. Topical report, December 1983-August 1986, 12:47649 (R;US)
Evaluation and testing of trochoid refrigerating compressor. Final report, January-June 1986, 12:47651 (R;US)
Physical and chemical properties of finely ground de-ashed coal. Final report, April 1984-February 1987, 12:47042 (R;US)
Thermally initiated carbon-carbon bond-cleavage reactions occurring during coal gasification. Annual report, April 1986-March 1987, 12:47031 (R;US)
Institute of Mathematical Sciences, Madras (India)
Families of Bose rays in quantum optics, 12:49011 (R;US)
Institute of Occupational Medicine, Edinburgh (UK)
Proceedings of the seminar on the ergonomics of locomotives and free-steered vehicles, 12:47093 (R;GB)
Institut Laue-Langevin, 38 - Grenoble (France)
Neutron capture studies on ^{189}Os, 12:48888 (R;US)
Institut National des Industries Extractives, Liege (Belgium)
Drivage of staple shafts, 12:47077 (R;XE;In French)
Shield supports simpler, lighter, more efficient, 12:47079 (R;XE;In French)
International Atomic Energy Agency, Vienna (Austria). International Nuclear Data Committee
Exciton cascade model for fast neutron reactions, 12:48906 (R;XA)
International Atomic Energy Agency, Vienna (Austria). International Working Group on Water Reactor Fuel Performance and Technology
Properties of materials for water reactor fuel elements and methods of measurement: Proceedings of a technical committee meeting, 12:47406 (R;AT)
International Bank for Reconstruction and Development, Washington, DC (USA). Industry Dept.
World nitrogen survey. Technical paper, 12:47589 (R;US)
Internationale Kommission zum Schutze des Rheins gegen Verunreinigung, Koblenz (Germany, F.R.)
Book of tables on the physico-chemical investigation of the Rhine water 1985, 12:48429 (R;DE;In German and French)
International Energy Agency Coal Research, London (UK)
Coal research projects. Exploration, mining and preparation - 1987 supplement, 12:47092 (R;GB)
Coal research projects. Properties, conversion and combustion - 1987, 12:47029 (R;GB)
Coal research projects. Supply, transport and the environment - 1987 supplement, 12:47056 (R;GB)
Cost and availability of Canadian coal, 12:47115 (R;GB)
Iowa State Univ. of Science and Technology, Ames (USA)
Extending applications of the transient energy function method: Final report, 12:47343 (R;US)
Iowa Univ., Iowa City (USA)
Radium removal using sorption to filter sand, 12:48439 (R;US)
Iowa Univ., Iowa City (USA). Dept. of Chemical and Materials Engineering
Evaluation of the chemical and physical processes affecting sulfate and nitrate wet deposition, 12:48360 (R;US)
Iowa Univ., Iowa City (USA). Dept. of Chemistry
Synthesis of novel fluorinated phosphonic and phosphinic acid electrolytes for phosphoric acid fuel cells. Annual report, June 1986-May 1987, 12:47621 (R;US)
Iowa Univ., Iowa City (USA). Dept. of Physics and Astronomy
Latitudinal motions of the aurora during substorm, 12:48537 (R;US)
Quadrennial review of the magnetotail, 12:48690 (R;US)

J

J and A Associates, Inc., Golden, CO (USA)
Evaluation of naphthene-rich turbine fuels as heat sinks for hypersonic aircraft. Final report, July-December 1986, 12:47137 (R;US)
Japan Atomic Energy Research Inst., Tokai, Ibaraki
US-Japan Cooperative Program on neutron scattering, 12:48973 (R;US)
Jet Propulsion Lab., Pasadena, CA (USA)
Peak-power cost-reduction guidebook. Final report, May 1983-December 1985, 12:47601 (R;US)
Johnson (E.R.) Associates, Inc., Reston, VA (USA)
1987 Federal interim storage fee study: A technical and economic analysis, 12:47202 (R;US)
Joint Inst. for Nuclear Research, Dubna (USSR)
JINR rapid communications. Collection, 12:49034 (R;SU)
JINR rapid communications. Collection, 12:48746 (R;SU;In Russian)
Nuclear structure. Proceedings of the International School on Nuclear Structure, 12:48944 (R;SU)
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation
On the mechanism of relativistic deuteron fragmentation on nuclei, 12:48947 (R;SU;In Russian)
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy
Characteristics of atomic nuclei employed as targets in high-energy nuclear collisions, 12:48945 (R;SU)
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Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems
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Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions
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Experimental study of α-fission fragment correlations in the ^{232}Th(^{12}C,αf) reaction, 12:48899 (R;SU)
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics
About energy degeneracy of some nucleon excited states in the Skyrme model, 12:48853 (R;SU;In Russian)
Adiabatic representation of a three-body problem in the limit of separated atom in natural coordinates, 12:49039 (R;SU;In Russian)
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Jones (J.A.) Applied Research Co., Charlotte, NC (USA)
EPRI Nondestructive Evaluation Center: 1986 annual report, 12:47470 (R;US)

K

Kaiser (Raymond) Engineers, Inc., Homer City, PA (USA)
Upgrading Upper Kittanning Seam coal quality to improve power plant performance: Coal cleaning test facility campaign report No. 6, 12:47025 (R;US)
Kansas State Univ., Manhattan (USA)
[The development of a new and novel Hadamard transform infrared spectrometer for analytical chemistry]: Progress report, May 15, 1985-now, 12:48278 (R;US)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Physik
Supercritical aqueous systems under high pressure. A statistical-thermodynamical equation of state and experimental investigations, 12:47992 (R;DE;In German)
Kauppa-ja Teollisuusministerio, Helsinki (Finland). Energiaosasto
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Kent State Univ., OH (USA)
Measures of diversity based on fuzzy multinomial distributions, 12:49172 (R;US)
Kentucky Univ., Lexington (USA). Dept. of Chemical Engineering
Separation of dilute hazardous organics by low-pressure composite membranes. Final report, April 1985-December 1986, 12:48432 (R;US)
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung
Point vortex dynamics: Recent results and open problems, 12:48738 (R;US)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung
Gas contrasting of multiphase and composite materials, 12:48138 (R;DE;In German)
Kiel Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet
Measurement of the turbulent impulse- and salt transport in the mixing zone of the river Elbe, 12:48428 (R;DE;In German)
Kinetics Group, Inc., Mercer Island, WA (USA)
Pumped spoiling experimental program, 12:47338 (R;US)
Kongelige Veterinaer- og Landbohoejskole, Tastrup (Denmark). Jordbrugsteknisk Inst.
Straw-fueled furnace with gas scrubbers, 12:47269 (R;DK;In Danish)
Koninklijke Nederlandse Hoogovens en Staalfabrieken, Ijmuiden
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L

Lappeenrannan Teknillinen Korkeakoulu (Finland). Energiatekniikan Laitos
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Lawrence Berkeley Lab., CA (USA)
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Annual environmental monitoring report of the Lawrence Berkeley Laboratory, 1986, 12:48501 (R;US)
Determination of UTW K/sub XSi/ factors for low atomic number microanalysis: A systematic approach, 12:47903 (R;US)
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Adiabatic supernova expansion into the circumstellar medium, 12:48687 (R;US)
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Fourth symposium on containment of underground nuclear explosions: Abstracts, 12:48303 (R;US)
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Lehigh Univ., Bethlehem, PA (USA). Dept. of Mechanical Engineering and Mechanics
Investigations of creep cavitation in Type 304 stainless steel: Final report, 8 May 1984-11 November 1986, 12:47813 (R;US)

Little (Arthur D.), Inc., Cambridge, MA (USA)
Interim medical decontamination handbook preparation. Phase 1: test plan development. Interim report (Final), August 1983-April 1985, 12:47799 (R;US)
Technology status of components for gas-fired cooling systems. Topical report, July 1986-January 1987, 12:47650 (R;US)

Lockheed Engineering and Management Services Co., Inc., Las Vegas, NV (USA)
National Surface Water Survey: Western Lake Survey (Phase 1 - synoptic chemistry) quality assurance plan, 12:48431 (R;US)

Lockheed Missiles and Space Co., Palo Alto, CA (USA). Lockheed Palo Alto Research Lab.
Tensile behavior of superplastic Al-Cu-Li-Zr alloy 2090 at cryogenic temperatures, 12:47826 (R;US)

Los Alamos National Lab., NM (USA)
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A role for national laboratories in enhancing economic competitiveness: The example of high-temperature superconductors: CNSS papers, No. 1, 12:47592 (R;US)
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Relativisitic hydrodynamics and heavy ion reactions, 12:48951 (R;US)
San Ignacio (La Tembladera) geothermal site, Departamento de Francisco Morazan, Honduras, Central America: Geological field report, 12:47325 (R;US)
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Transverse collective instability in the PSR [Proton Storage Ring], 12:48227 (R;US)
X-ray emission from high-Z spherical laser plasmas: Implications for plasma dynamics, 12:49088 (R;US)

Louisiana State Univ., Baton Rouge (USA). Dept. of Chemistry
Theoretical studies of electron and proton transfer processes in fluids: Progress report, August 1986 to September 1987, 12:47948 (R;US)

Lowell Univ., MA (USA). Radiation Lab.
Neutron scattering studies in the actinide region: Progress report for period August 1, 1986-July 30, 1987, 12:48897 (R;US)

Lund Univ. (Sweden)
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Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire
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Massachusetts Inst. of Tech., Cambridge (USA). Sloan Automotive Engine Lab.
Piston ring friction and vehicle fuel economy: Final report, November 1, 1983-January 31, 1987, 12:47713 (R;US)

Massachusetts Inst. of Tech., Cambridge (USA). Space Systems Lab.
Factors for MPD (magnetoplasma dynamic) thrustors. Annual report, 15 December 1983-14 December 1984, 12:48734 (R;US)

Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.
Diode lasers with cylindrical mirror facets and reduced beam divergence, 12:48109 (R;US)

Material Concepts, Inc., Columbus, OH (USA)
Discontinuous reinforced MMC (metal-matrix composite) by improved sonic distribution of SiC into molten aluminum. Technical report (Final), 28 June 1985-28 February 1987, 12:47883 (R;US)

Metsaeteho, Helsinki (Finland)
Model for optimising the use of wood raw material, 12:47270 (R;FI;In Finnish)

Michigan State Univ., East Lansing (USA). Dept. of Physics and Astronomy
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Michigan Technological Univ., Houghton (USA). Dept. of Physics
Theory of defects in non-metallic solids: Progress report, 1 August 1986 to 31 July 1987, 12:47894 (R;US)

Michigan Univ., Ann Arbor (USA)
US Department of Energy Nuclear Energy University program in robotics for advanced reactors: Program plan, FY 1987-1991, 12:48094 (R;US)

Michigan Univ., Ann Arbor (USA). Dept. of Chemical Engineering
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Minerals Management Service, Anchorage, AK (USA). Alaska Outer Continental Shelf Region
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Mine Safety and Health Administration, Denver, CO (USA). Safety and Health Technology Center
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Ministry of Agriculture and Forestry, Helsinki (Finland)
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Minnesota Univ., Minneapolis (USA). Dept. of Mechanical Engineering
Study of the use of Y_2O_3 doped ZrO_2 membranes for solar electrothermal and solar thermal separations. Technical report, 12:47318 (R;US)

Mission Research Corp., Albuquerque, NM (USA)
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Mississippi-Alabama Sea Grant Consortium, Biloxi, MS (USA)
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Missouri Univ., Columbia (USA). Water Resources Research Center
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Missouri Univ., Rolla (USA)
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Monsanto Research Corp., Miamisburg, OH (USA). Mound
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National Aeronautics and Space Administration, Moffett Field, CA (USA). Ames Research Center
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National Aeronautics and Space Administration, Washington, DC (USA)
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National Board of Waters, Helsinki (Finland)
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National Bureau of Standards, Boulder, CO (USA)
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National Bureau of Standards, Boulder, CO (USA). Chemical Engineering Science Div.
Basic gas metering. Annual report, April 1984-March 1985, 12:47170 (R;US)
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National Bureau of Standards, Boulder, CO (USA). Thermophysics Div.
Thermophysical properties of fluids for the gas industry. Annual report, January-December 1986, 12:47177 (R;US)

National Bureau of Standards, Washington, DC (USA)
Model for the nuclear effects of the d-t-muon fusing state, 12:48875 (R;US)
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National Bureau of Standards, Washington, DC (USA). Center for Electronics and Electrical Engineering
Optical power line voltage and current measurement systems: Volume 2, Assessment of future optical measurements of voltage and current in electric power systems: Final report, 12:47367 (R;US)

National Center for Atmospheric Research, Boulder, CO (USA)
Kinetics investigations of atmospheric chemical reactions. Doctoral thesis, 12:48368 (R;US)

Nationale Genossenschaft fuer die Lagerung Radioaktiver Abfaelle (NAGRA), Baden (Switzerland)
Backfilling and sealing of tunnels, shafts and boreholes. Volume 2: Appendices, 12:47226 (R;CH;In German)

National Energy Information Center, Washington, DC (USA)
Coal Distribution Data, 1980-1986 (EIA Form 6). Data file, 12:47116 (R;US)

National Geophysical Data Center, Boulder, CO (USA)
Solar-Geophysical Data Number 513, May 1987. Part 2. (comprehensive reports). Data for November 1986, and miscellanea, 12:48684 (R;US)
Solar-Geophysical Data Number 513, May 1987. Part 1 (prompt reports). Data for April, March 1987 and late data, 12:48683 (R;US)

National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)
Formaldehyde-exposure characterization in garment-manufacturing plants: a composite summary of three in-depth industrial-hygiene surveys, 12:48342 (R;US)
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National Inst. for Occupational Safety and Health, Cincinnati, OH (USA). Div. of Physical Sciences and Engineering
Evaluation of a coated-filter sampling method for the determination of isocyanate concentrations in air, 12:48341 (R;US)

National Inst. for Occupational Safety and Health, Cincinnati, OH (USA). Div. of Surveillance, Hazard Evaluation and Field Studies
Development and application of algorithms for generating estimates of toxicity for the NOHS (National Occupational Hazard Survey) data base. Technical report, 12:48528 (R;US)

National Inst. for Petroleum and Energy Research, Bartlesville, OK (USA)
Carboxymethylated ethoxylated surfactants: Annual report, 12:47134 (R;US)
Geological characterization and statistical comparison of outcrop and subsurface facies: Shannon shelf sand ridges: Topical report, 12:47124 (R;US)

National Oceanic and Atmospheric Administration, Boulder, CO (USA). Space Environment Lab.
Space Environment Laboratory annual report - FY 1986, October 1, 1985 to September 30, 1986, 12:48696 (R;US)
TIROS-N/NOAA A-J space environment monitor subsystem. Technical memo, 12:48695 (R;US)

National Ocean Service, Anchorage, AK (USA). Ocean Assessments Div.
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Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)
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Naval Academy, Annapolis, MD
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Optical measurement of the rms (root-mean-square) roughness of ion-bombarded surfaces. Final report, 1986-1987, 12:47807 (R;US)

Naval Air Development Center, Warminster, PA (USA). Air Vehicle and Crew Systems Technology Directorate
Corrosion behavior of metal-matrix composites. Final report, June 1985-June 1986, 12:47882 (R;US)

Naval Observatory, Washington, DC (USA)
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Naval Postgraduate School, Monterey, CA (USA)
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Naval Research Lab., Washington, DC (USA). Optical Sciences Div.
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Naval Weapons Center, China Lake, CA (USA)
Coso Monitoring Program. Summary report, October 1985-September 1986, 12:47326 (R;US)

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New Jersey Dept. of Transportation, Trenton (USA). Div. of Research and Demonstration
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New York Energy Ofice, Albany (USA). Div. of Policy Analysis and Planning
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New York Univ., NY (USA). Inst. of Environmental Medicine
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New York Univ., NY (USA). Radiation and Solid State Lab.
The photophysics and chemistry of PAH [polycyclic aromatic hydrocarbons] compounds: Research progress report, September 1, 1985 to August 31, 1987, 12:48317 (R;US)

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North Carolina State Univ., Raleigh (USA)
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North Dakota Univ., Grand Forks (USA). North Dakota Mining and Mineral Resources Research Inst.
Characterization, extraction, and reuse of coal-gasification solid wastes. Volume 3. Technical and economic feasibility of bulk utilization and metal recovery for ashes from an integrated coal-gasification facility. Final report, April 1983-June 1986, 12:47059 (R;US)
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Northwestern Univ., Evanston, IL (USA). Dept. of Chemistry
Electron-transfer mechanisms in thermochemical gasification: a quantitative quantum-mechanical investigation. Annual report, January-December 1986, 12:47032 (R;US)
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Nuclear Metals, Inc., Concord, MA (USA)
Atmosphere-assisted machining of depleted-uranium (DU) penetrators. Final report, 12:47205 (R;US)
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Nuclear Regulatory Commission, Washington, DC (USA). Div. of Engineering
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The Roof Research Center: A National User Facility for thermal performance and durability of roofing systems: Interim users manual, 12:47647 (R;US)
US Department of Energy Nuclear Energy University program in robotics for advanced reactors: Program plan, FY 1987-1991, 12:48094 (R;US)
US-Japan Cooperative Program on neutron scattering, 12:48973 (R;US)

Oak Ridge National Lab., TN (USA). Fusion Engineering Design Center
System studies of compact ignition tokamaks, 12:49137 (R;US)

Oak Ridge Y-12 Plant, TN (USA)
Simplifying control system modeling using data scanning techniques, 12:48103 (R;US)

Office of Technology Assessment (U.S. Congress), Washington, DC
From pollution to prevention: a progress report on waste reduction. Special report, 12:47584 (R;US)

Office of the Under Secretary of Defense for Research and Engineering, Washington, DC (USA)
Chemical warfare - biological defense research obligations. Annual report, 1 October 1985-30 September 1986, 12:47798 (R;US)

Oklahoma State Univ., Stillwater (USA). Dept. of Physics
Angular distribution of W boson pairs at a heavy Z-resonance, 12:48775 (R;US)

Oklahoma Univ., Norman (USA)
A study of micellar-enhanced ultrafiltration: Final technical report, March 1, 1984-February 28, 1987, 12:48424 (R;US)

Oregon Dept. of Fish and Wildlife, Portland (USA). Habitat Conservation Div.
A wildlife habitat protection, mitigation and enhancement plan for eight federal hydroelectric facilities in the Willamette River Basin: Final report, 12:47277 (R;US)

Oregon Univ., Eugene (USA)
Reduced-mass Fock-Tani representations for $a^+ + (b^+ c^-) = (a^+ c^-) + b^+$ and first-order results for (abc)=(ppe, epe, $\mu p\mu$, $\mu d\mu$, and $\mu t\mu$). Technical report, 12:48697 (R;US)
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Osaka Univ. (Japan)
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Oslo Univ. (Norway). Fysisk Inst.
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Section for nuclear physics annual report, January 1-December 31, 1986, 12:49159 (R;NO)

Otto (R.G.) and Associates, Reston, VA (USA)
Compensatory mechanisms in fish populations: An EPRI research plan: Final report, 12:48441 (R;US)

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Pacific Northwest Lab., Richland, WA (USA)
Chemical characterization of fossil fuel combustion wastes: Final report, 12:47055 (R;US)
Columbia River Statistical Update Model, Version 4.0 (COLSTAT4): Background documentation and user's guide, 12:48442 (R;US)
Development and validation of a real-time SAFT-UT [synthetic aperture focusing technique for ultrasonic testing] system for the inspection of light water reactor components: Annual report, October 1985-September 1986, 12:47408 (R;US)
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Hanford Meteorological Station computer codes: Volume 2, The PROD computer code, 12:48312 (R;US)
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Turning over new ground: An impact evaluation of an irrigated agriculture program, 12:47704 (R;US)

Padua Univ. (Italy). Dipartimento di Fisica
Enhanced diffusion processes during heavy-ion irradiation of glasses, 12:47911 (R;US)

Paducah Gaseous Diffusion Plant, KY (USA)
Application of fixed bed trapping technology for the removal of low concentration UF_6 from plant gaseous effluent streams, 12:47194 (R;US)

Paris-11 Univ., 91 - Orsay (France). Inst. de Physique Nucleaire
About nucleon-nucleon potential: meson exchange currents and relativistic approach of nuclear structure, 12:48920 (R;FR;In French)
Neighbouring charge fragmentations in low energy fission, 12:48919 (R;FR)

Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire
Experimental search of gluonic mesons, 12:48826 (R;FR;In French)
Observation of eta/sub c/ -> rho/sup 0/rho/sup 0/ and review of other eta/sub c/ decay modes, 12:48766 (R;FR)
Recent results on jet-physics and QCD tests by UA1 and UA2 at the CERN proton-antiproton collider, 12:48767 (R;FR)

PAR Technology Corp., McLean, VA (USA)
Artificial Intelligence/Enemy Courses of Action (AI/ENCOA) user's manual. Final report, January 1984-February 1985, 12:47797 (R;US)

Partnerships Ltd., Lawrenceville, NJ (USA)
Advanced aircraft-fuel evaluation. Phase 1. Final report, June 1986-January 1987, 12:47136 (R;US)

PEI Associates, Inc., Cincinnati, OH (USA)
Characteristics, deposition, and fate of inhaled particulate matter, 12:48530 (R;US)

Pennsylvania State Univ., University Park (USA)
Hydrogen annealing of P/sub b/ and E' defect centers in oxidized silicon wafers, 12:47886 (R;US)

Pennsylvania State Univ., University Park (USA). Dept. of Chemical Engineering
Characterization of catalysts with metal-support effects and of the species adsorbed on their surfaces: Progress report, September 1, 1986-August 30, 1987, 12:47812 (R;US)

Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering
Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly report for the period 1 July 1985-30 September 1985, 12:47017 (R;US)
Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly report for the period 1 October-31 December 1985, 12:47018 (R;US)
Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly reports for the period 1 April-30 September 1986, 12:47020 (R;US)
Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly report for the period 1 January-31 March 1986, 12:47019 (R;US)

Pennsylvania State Univ., University Park (USA). Materials Research Lab.
Residual and applied stress analysis of an alloy 600 row 1 U-bend: Final report, 12:47416 (R;US)

Pentek, Inc., Coraopolis, PA (USA)
Development of a testing and analysis methodology to determine the functional condition of solenoid operated valves, 12:47534 (R;US)

Performance Associates, Inc., Rocky Hill, CT (USA)
User's guide for signal validation software: Final report, 12:47443 (R;US)

Physical Sciences, Inc., Andover, MA (USA)
Colloidal-dynamics simulations of rheology and stability of concentrated-fuel slurries. Final report, 15 August 1986-15 April 1987, 12:47036 (R;US)

Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering
Automation of a hydrogen probe for determination of hydrogen solubilities in coal liquids solvents, 12:47039 (R;US)

Pittsburgh Univ., PA (USA). Inst. for Computational Mathematics and Applications
Iterative solutions of sparse linear systems on systolic arrays. Technical report, 12:49164 (R;US)

Politechnika Warszawska (Poland). Inst. Fizyki
Octupole instability in the heavy barium region, 12:48902 (R;US)

Power Technologies, Inc., Schenectady, NY (USA)
12-phase as a transmission alternative, 12:47363 (R;US)

Princeton Univ., NJ (USA). Dept. of Chemical Engineering
Aerated and vibrated chute feeders for particulate materials: Quarterly technical report for the period June 1, 1987 to August 31, 1987, 12:48095 (R;US)

Princeton Univ., NJ (USA). Plasma Physics Lab.
Application of polarized nuclei to fusion, 12:49094 (R;US)
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Diagonal Pade approximations for initial value problems, 12:49097 (R;US)
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Queen's Univ., Belfast, Northern Ireland (UK). Dept. of Applied Mathematics and Theoretical Physics
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Radian Corp., Austin, TX (USA)
Characterization and disposal of coal-gasification waste products. Phase 2. Topical report, 1 May 1984-30 April 1986, 12:47060 (R;US)
Process description of the SASOL 1 coal-gasification plant. Topical report, 12:47030 (R;US)
Radievyj Inst., Leningrad (USSR)
Calculation of solids angles for the elliptical source-rectangular detector system, 12:48265 (R;SU;In Russian)
Regensburg Univ. (Germany, F.R.). Naturwissenschaftliche Fakultaet 4 - Chemie und Pharmazie
Development and method of use of a mass spectrometric isotope dilution analysis within the use of negative thermoionisation for determination of boron traces, 12:47938 (R;DE;In German)
Regional Economic Research, San Diego, CA (USA)
Models of commercial sector equipment and fuel decisions for the COMMEND code: Framework design and data development plan: Final report, 12:47605 (R;US)
Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Materials Engineering
Mechanism of mechanical fatigue of fused silica: Progress report, July 1, 1985-August 31, 1987, 12:47893 (R;US)
Research Triangle Inst., Research Triangle Park, NC (USA)
Development and demonstration of indoor radon-reduction measures for 10 homes in Clinton, New Jersey. Final report, April 1986-January 1987, 12:48384 (R;US)
ResTech Houston, Inc., TX (USA)
Development of petrophysical techniques for evaluating tight-gas sands. Annual technical report, March 1986-February 1987, 12:47175 (R;US)
Rice Univ., Houston, TX (USA). Dept. of Chemical Engineering
Measurement and interpretation of the solubility of a normal fluid in a hydrogen-bonding solvent: the methane-methanol system. Topical report, 12:47263 (R;US)
Risoe National Lab., Roskilde (Denmark)
Department of Energy technology annual progress report, 1 January-31 December 1986, 12:49160 (R;DK)
Introduction of a hypothetical ocean current power unit into the Faeroe Island energy system, 12:47276 (R;DK;In Danish)
Rochester Univ., NY (USA). Dept. of Chemistry
Direct infrared absorption of clusters in pulsed molecular beams: First progress report, May 1, 1986 to July 31, 1987, 12:48717 (R;US)
Rochester Univ., NY (USA). Lab. for Laser Energetics
A generalized EXIT, 12:49175 (R;US)
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Enhanced Thomson scattering from laser plasmas, 12:49125 (R;US)
LLE [Laboratory for Laser Energetics] review, Volume 31: Quarterly report, April-June 1987, 12:49127 (R;US)
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Rochester Univ., NY (USA). Nuclear Structure Research Lab.
Migration in alluvium of chlorine-36 and tritium from an underground nuclear test, 12:48404 (R;US)
Rockwell International Corp., Canoga Park, CA (USA). Energy Technology Engineering Center
Measured piping and component heat losses from a typical SFBP [Solar in Federal Buildings Program] solar system, 12:47320 (R;US)
Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant
Low-pressure eutectic bonding of depleted uranium to copper, 12:47839 (R;US)
Personal computers: A powerful tool for project management, 12:49215 (R;US)
Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations
Rockwell Hanford Operations effluents and solid waste burials during calendar year 1986, 12:47229 (R;US)
Rockwell International Corp., Thousand Oaks, CA (USA). Science Center
Progress toward a crystal streak camera using tungsten bronze crystals for the electrooptic material, 12:48292 (R;US)
Rondout Associates, Inc., Stone Ridge, NY (USA)
Source depths utilizing broad-band data. Final report, 11 April 1985-28 February 1987, 12:48310 (R;US)
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Chemical Technology
AFC power plant. Feasibility study, 12:47627 (R;SE)

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Saint Paul District Heating Development Co., MN (USA)
Aquifer thermal energy storage district cooling in downtown St. Paul, Minnesota: Feasibility study, 12:47709 (R;US)
Sandia National Labs., Albuquerque, NM (USA)
A linear-flow interpretation of the H-3 multiwell pumping test conducted at the Waste Isolation Pilot Plant (WIPP) site, 12:47231 (R;US)
A tutorial on Rogowski coil theory and operation, 12:48289 (R;US)
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The aerothermodynamic environment for holes in hypersonic configurations, 12:48099 (R;US)
The method of lines for time dependent free boundary problems, 12:49216 (R;US)

Sandia National Labs., Livermore, CA (USA)
Report on the joint meeting of the Division of Development and Technology Plasma/Wall Interaction and High Heat Flux Materials and Components Task Groups, 12:49121 (R;US)
Sandia Combustion Research Program: Annual report, 1986, 12:48089 (R;US)

Savannah River Ecology Lab., Aiken, SC (USA)
Environmental research on actinide elements, 12:48408 (R;US)

Savannah River Lab., Aiken, SC (USA)
Canyon solvent cleaning with activated alumina, 12:47196 (R;US)
Colorometric determination of Fe(II)/Fe(III) ratio in glass, 12:47936 (R;US)
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The sensitivity index as a screening tooling in the uncertainty analysis of ground-water contaminant transport, 12:47214 (R;US)

School of Aerospace Medicine, Brooks AFB, TX (USA)
Frequency-dependent energy absorption in the body and tail of the rodent carcass exposed to radiofrequency radiation. Final report, 31 June-31 December 1985, 12:48533 (R;US)

Science Applications International Corp., Homer City, PA (USA). Homer City Office
Upgrading Upper Kittanning Seam coal quality to improve power plant performance: Coal cleaning test facility campaign report No. 6, 12:47025 (R;US)

Science Applications International Corp., La Jolla, CA (USA)
Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project, 12:47622 (R;US)
Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project. Executive Summary. Topical report, 1983-1985, 12:47625 (R;US)
Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project. Volume 2. Topical report, 1983-1985, 12:47624 (R;US)
Characterization of instrumented sites for the Onsite Fuel-Cell Field-Test project. Volume 1. Topical report, 1983-1985, 12:47623 (R;US)

Science Applications International Corp., San Diego, CA (USA)
Numerical simulation of internal combustion engine flows: Development and users guide for MAGIC radial-azimuthal version, 12:47714 (R;US)

Science Research Lab., Inc., Somerville, MA (USA)
New concept for scaling excimer-laser amplifiers. Technical report (Final), 1 October 1985-30 April 1987, 12:48113 (R;US)

Senter for Industriforskning, Oslo (Norway)
GASKICK - a knowledge based system for drilling supervision and gas kick detection, 12:47142 (R;NO)

Service Central de Protection contre les Rayonnements Ionisants, 78 - Le Vesinet (France)
Monthly results of measurements, October 1986, 12:48397 (R;FR;In French)

SFA Pacific, Inc., Mountain View, CA (USA)
Assessment of non-traditional uses of advanced coal utilization technologies in the industrial sector: Final report, 12:47340 (R;US)

SINTEF, Trondheim (Norway)
Environmental studies connected with establishing an incinerator plant in Trondheim. 4th quarterly report 1984, 12:48443 (R;NO;In Norwegian)
Wind loads on the Valhall quarters platform on the Norwegian continental shelf. Model tests and comparison with full-scale measurements, 12:48163 (R;NO)

Society for Industrial and Applied Mathematics, Philadelphia, PA (USA)
SIAM [Society for Industrial and Applied Mathematics] conference on optimization, 18-20, 1987, 12:49180 (R;US)

Solar Energy Research Inst., Golden, CO (USA)
A quasi-physical model for converting hourly global horizontal to direct normal insolation, 12:47296 (R;US)
Direct absorption receiver (DAR) systems assessment, 12:47317 (R;US)
Effects of exposure testing on pipe insulation: FY 1986, progress report, 12:47322 (R;US)
HBCU [Historically Black Colleges and Universities] solar radiation network annual report: FY 1986, 12:47295 (R;US)
The formation of optical membrane reflector surfaces using uniform pressure loading, 12:47316 (R;US)

Solar Turbines, Inc., San Diego, CA (USA)
Field test of a ceramic heat-recovery system for an aluminum reverberatory furnace. Final report, November 1984-December 1986, 12:47703 (R;US)
NO/sub x/ reduction for small gas turbine power plants: Final report, 12:47357 (R;US)

Sonoma Technology, Inc., Santa Rosa, CA (USA)
Chemical, aerosol, and optical measurements in the plumes of three midwestern coal-fired power plants, 12:47360 (R;US)

South African Association of Physicists in Medicine and Biology, Pretoria
South African Association of Physicists in Medicine and Biology: 25. Anniversary Congress, 18-22 March 1985, Cape Town, 12:48470 (R;ZA;In Afrikaans and English)

Southwest Research Inst., San Antonio, TX (USA)
Endurance testing of a natural-gas-fueled rotary engine. Final report, March 1985-January 1987, 12:47716 (R;US)

Southwest Research Inst., San Antonio, TX (USA). Engineering and Materials Science Div.
Analysis of crack propagation and arrest in welded LNG (liquefied natural gas) storage tanks. Final report, March 1984-October 1986, 12:47180 (R;US)

SRI International, Menlo Park, CA (USA)
Analysis of middle-distillate fuels by high-resolution field-ionization mass spectrometry. Annual report (Final), 1 June 1982-November 1986, 12:47139 (R;US)
Laser probes of natural gas ignition chemistry. Final report, January 1984-December 1986, 12:47178 (R;US)

SRI International, Menlo Park, CA (USA). Artificial Intelligence Center
ONR (Office of Naval Research) research in distributed reasoning and planning. Interim report, February 1985-February 1987, 12:49167 (R;US)

Stanford Linear Accelerator Center, Menlo Park, CA (USA)
Experimental studies of electromagnetic properties of few body systems, 12:48770 (R;US)
J/psi and Y radiative and hadronic decays, 12:48830 (R;US)
Phenomenological implications of the blown-up orbifolds, 12:48861 (R;US)
Restrictions on two Higgs doublet models and CP violation at the unification scale, 12:48860 (R;US)
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Stanford Univ., CA (USA)
Energy changes in transforming solids: Final report, April 1, 1982 to November 30, 1986, 12:47804 (R;US)

Stanford Univ., CA (USA). Dept. of Physics
Advanced laser-source research. Technical report (Final), 1 April 1978-31 March 1987, 12:48112 (R;US)

Stanford Univ., CA (USA). Systems Optimization Lab.
An analysis of an available set of linear programming test problems, 12:49217 (R;US)

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Statens Inst. for Straalehygiene, Oslo (Norway)
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State Univ. of New York, Plattsburg (USA). Dept. of Physics
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State Univ. of New York, Stony Brook (USA). Inst. for Theoretical Physics
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STD Research Corp., Arcadia, CA (USA)
Analytical investigation of critical MHD [magnetohydrodynamics] phenomena: Final report for the period 15 September 1980-31 August 1986, 12:47612 (R;US)

Stearns Catalytic Corp., Denver, CO (USA)
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Stockholm Univ. (Sweden). Dept. of Meteorology
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Stone and Webster Engineering Corp., Denver, CO (USA)
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Strasbourg-1 Univ., 67 (France). Centre de Recherches Nucleaires
Contribution to study of effects consecutive to alpha decay of uranium 238 in some uranium compounds and uranium ores, 12:48033 (R;FR;In French)

Strat Co., Salt Lake City, UT (USA)
Production of high-energy aviation fuels from advanced coal liquids. Phase 1. Final report, June 1986-February 1987, 12:47013 (R;US)

Studsvik Energiteknik AB, Nykoeping (Sweden)
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Suomen Akatemja, Helsinki (Finland)
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Suunnittelurengas Oy, Helsinki (Finland)
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Sverdrup Technology, Inc., Cleveland, OH (USA)
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Swedish Council for Building Research, Stockholm
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Swedish Environmental Research Inst., Stockholm
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Technische Univ. Berlin (Germany, F.R.). Fachbereich Physik
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Technische Univ. Berlin (Germany, F.R.). Fachbereich Physikalische Ingenieurwissenschaft
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Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen
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Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet
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Technische Univ. Muenchen, Garching (Germany, F.R.). Fakultaet fuer Chemie, Biologie und Geowissenschaften
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Technische Univ. Muenchen (Germany, F.R.). Fakultaet fuer Maschinenwesen
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Teknekron Research, Inc., Berkeley, CA (USA)
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Distributing the risks of interbasin water transfers under drought conditions: the dilemma posed by coal-slurry pipelines. A summary version, 12:47098 (R;US)
Tennessee Univ., Knoxville (USA)
A modeling study of vacuum sorption characteristics of carbon dioxide on 4A zeolite molecular sieves, 12:47940 (R;US)
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Tennessee Univ., Knoxville (USA). Dept. of Chemistry
Synthesis of novel acid electrolytes for phosphoric-acid fuel cells. Annual report, May 1986-April 1987, 12:47626 (R;US)
Tennessee Univ., Knoxville (USA). Dept. of Nuclear Engineering
Empirical modeling of steady-state behavior of linear and nonlinear systems with application to signal validation: Topical report, 12:47442 (R;US)
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Tennessee Univ., Knoxville (USA). Dept. of Physics
Cold highly ionized ions: Comparison of energies of recoil ions produced by heavy ions and by synchrotron radiation x rays, 12:48713 (R;US)
Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy
Vacuum ultraviolet electronic properties of liquids: Annual progress report, February 1, 1987-January 31, 1988, 12:48993 (R;US)

Tennessee Univ., Tullahoma (USA). Space Inst.
[The MHD [magnetohydrodynamics] coal fired flow facility]: Quarterly technical progress report, April-June 1987, 12:47610 (R;US)
Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology
Homeostatic utility controls applied to TVA: Final project report, 12:47354 (R;US)
Tennessee Valley Authority, Muscle Shoals, AL (USA). Office of Agricultural and Chemical Development
Atmospheric fluidized-bed combustion waste utilization in cement and sulfuric acid: Preliminary feasibility study, 12:47112 (R;US)
Tennessee Valley Authority, Norris (USA). Div. of Land and Economic Resources
Ecological recovery after reclamation of toxic spoils left by coal surface mining. Phase 2. An assessment of environmental changes following intensive remedial treatments. Report for July 1975-September 1981, 12:47058 (R;US)
Tetra Tech, Inc., Lafayette, CA (USA)
Sampling guidelines for groundwater quality: Final report, 12:48425 (R;US)
Texas A and M Univ., College Station (USA)
Cyclotron based nuclear science: Progress report, April 1, 1986-March 31, 1987, 12:48866 (R;US)
Development and process evaluation of improved Fischer-Tropsch slurry catalysts: Quarterly technical progress report for the period 1 January to 31 March 1987, 12:47260 (R;US)
Spin and temperature dependence of nuclear deformation using alpha-gamma angular correlations, 12:48903 (R;US)
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Perturbation and characterization of nonlinear processes: Progress report, November 15, 1983-June 1, 1987, 12:49010 (R;US)
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Texas Univ., Austin (USA). Center for Particle Theory
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Research program in elementary particle theory: Progress report, January 1, 1987-December 1987, 12:48778 (R;US)
Texas Univ., Austin (USA). Computer and Vision Research Center
Automation recognition of tracking of objects. Final report, 1 January 1985-31 December 1986, 12:49168 (R;US)
Texas Univ., Austin (USA). Dept. of Aerospace Engineering and Engineering Mechanics
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Texas Univ., Austin (USA). Inst. for Fusion Studies
On tokamak equilibrium, 12:49061 (R;US)
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Texas Univ., Richardson (USA). Center for Quantum Electronics and Applications
Proof of the feasibility of coherent and incoherent schemes for pumping a gamma-ray laser. Annual progress report, 30 September 1986-31 May 1987, 12:48114 (R;US)
Tieraerztliche Hochschule Hannover (Germany, F.R.)
Effects of various forms of mastitis, in the progesterone concentrations of cow milk and milk fat, as determined by RIA and EIA, 12:48469 (R;DE;In German)
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Tokyo Univ., Tokai, Ibaraki (Japan). Nuclear Engineering Research Lab.
Report of the research results with University of Tokyo, Nuclear Engineering Research Laboratory's Facilities in fiscal 1985, 12:49161 (R;JP;In Japanese)
Study on removal and fixation for radioactive materials in dissolver off-gas, 12:47235 (R;JP;In Japanese)
Tracer Research Corp., Tucson, AZ (USA)
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Tsukuba Univ., Sakura, Ibaraki (Japan). Tandem Accelerator Center
Annual report of the Tandem Accelerator Center, University of Tsukuba, April 1, 1985-March 31, 1986, 12:49162 (R;JP)
Tyotehoseuran Julkaisuja, Helsinki (Finland)
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U

UKAEA Atomic Energy Research Establishment, Harwell. Instrumentation and Applied Physics Div.
The standard Harwell Carbon Meter: Revision, 12:47425 (R;GB)
Union Carbide Corp., Tarrytown, NY (USA). Linde Div.
Oxygen enriched combustion system performance study: Phase 1, Interim/final report: Volume 1, Technical and economic analysis, 12:48153 (R;US)
UNISOR, Oak Ridge, TN (USA)
Nuclear structure effects on alpha reduced widths, 12:48889 (R;US)

United Nations, Geneva (Switzerland). Economic Commission for Europe
Perfecting of maintenance and servicing systems for longwall face equipment, 12:47071 (R;XU)
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University of Southern California, Los Angeles (USA). Dept. of Chemistry
Neutron diffraction analysis of $HRh[P(C_6H_5)_3]_4$, 12:47887 (R;US)
USDOE Assistant Secretary for Environment, Safety, and Health, Washington, DC. Office of Environmental Audit
The environmental survey manual, 12:48316 (R;US)
USDOE Assistant Secretary for Fossil Energy, Washington, DC. Office of Petroleum Reserves
Strategic Petroleum Reserve quarterly report, 12:47163 (R;US)
USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Project and Facilities Management
Quarterly status of Department of Energy projects, 12:49152 (R;US)
USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Small and Disadvantaged Business Utilization
Report to Congress on the Small Business Program of the Department of Energy, FY 1986, 12:49153 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels
Electric power annual, 1986, 12:47603 (R;US)
Electric power monthly, June 1987, 12:47602 (R;US)
World nuclear fuel cycle requirements, 1987, 12:47604 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas
Petroleum supply monthly, June 1987, 12:47149 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Statistical Standards
An assessment of the quality of selected EIA [Energy Information Administration] data series: Petroleum supply data, 12:47150 (R;US)
Directory of Energy Information Administration model abstracts, 12:47574 (R;US)
USDOE Idaho Operations Office, Idaho Falls
The microcomputer as an engineering management tool, 12:48091 (R;US)
USDOE Office of Energy Research, Washington, DC. Office of Basic Energy Sciences
Energy Materials Coordinating Committee (EMaCC): Fiscal year 1986, Annual technical report, 12:47803 (R;US)
USDOE Office of Energy Research, Washington, DC. Office of Health and Environmental Research
Microbiology of subsurface environments: Proceedings second investigators' meeting, 12:48402 (R;US)
USDOE Office of Energy Research, Washington, DC. Scientific Computing Staff
ESNET [Energy Sciences Network], 12:49176 (R;US)
USDOE Office of Energy Research, Washington, DC. University and Industry Programs Div.
Guide for the preparation of applications for the University Research Instrumentation program, 1988, 12:49151 (R;US)
USDOE Office of Scientific and Technical Information, Oak Ridge, TN
Energy Data Base: Subject Thesaurus, 12:49225 (R;US)
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USDOE, Washington, DC
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VGB Technische Vereinigung der Grosskraftwerksbetreiber e.V., Essen (Germany, F.R.)
Special conference on thermal energy 'Yugoslavia 1986'. Proceedings, 12:47345 (R;DE;In German)
Virginia Univ., Charlottesville (USA). Dept. of Materials Science
Microstructural effects on the fatigue behavior of Fe-C-X alloys: Technical progress report, November 16, 1984-November 15, 1987, 12:47814 (R;US)
Virginia Univ., Charlottesville (USA). Dept. of Physics
Electron interactions with nuclei: Progress report, 12:48867 (R;US)
Fermi surface modifications and magnetic breakdown connected to charge-density waves in $NbSe_3$, 12:47902 (R;US)
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Volunteers in Technical Assistance, Inc., Arlington, VA (USA)
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Understanding wood wastes as fuel. Technical paper, 12:47271 (R;US)

W

Waring (Kevin) Associates, Anchorage, AK (USA)
Monitoring oil-exploration activities in the Beaufort Sea. Social and economic studies program technical report Number 107. Final report, 12:47127 (R;US)
Warren Spring Lab., Stevenage (UK)
Methods of sampling and analysis for sulphur dioxide, oxides of nitrogen and particulate matter in the exhaust gases of large combustion plants, 12:48321 (R;XE)
Washington Univ., Seattle (USA)
The Mark III vertex chamber, 12:48267 (R;US)
Washington Univ., Seattle (USA). Dept. of Electrical Engineering
[Nuclear magnetic resonance studies of ion motion in solid electrolytes]: Final report, 12:48991 (R;US)
Washington Univ., St. Louis, MO (USA). Dept. of Chemistry
Spin and temperature dependence of nuclear deformation using alpha-gamma angular correlations, 12:48903 (R;US)
Water General Corp., Lexington, MA (USA)
Laboratory protocol to demonstrate equivalency for plant wastewater cotreatment: Final report, 12:47358 (R;US)
Western Research Inst., Laramie, WY (USA)
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The notations in the final parentheses indicate the type of document, e.g., R for Report; the country of publication, e.g., US; and the language if other than English, e.g., In German. Tables of document types and country of publication codes appear after the indexes.

The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept (e.g., Pipeline Quality Gas, see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed. Copies of DOE/TIC-7000, the Subject Thesaurus, are available from the National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, VA 22161.

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Ecological recovery after reclamation of toxic spoils left by coal surface mining. Phase 2. An assessment of environmental changes following intensive remedial treatments. Report for July 1975-September 1981, 12:47058 (R;US)
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Analysis of rock chips produced during water-jet-assisted cutting. Report of Investigations/1987, 12:47097 (R;US)

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Physical and chemical properties of finely ground de-ashed coal. Final report, April 1984-February 1987, 12:47042 (R;US)
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Fine grinding of coal by the turbomilling process. Report of Investigations/1987, 12:47012 (R;US)
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Coal research projects. Exploration, mining and preparation - 1987 supplement, 12:47092 (R;GB)
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Fine grinding of coal by the turbomilling process. Report of Investigations/1987, 12:47012 (R;US)

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Previous to February 1980 this concept was indexed to GAS TURBINES.
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[The MHD [magnetohydrodynamics] coal fired flow facility]: Quarterly technical progress report, April-June 1987, 12:47610 (R;US)

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Improved coal liquefaction using carbon-supported hydrogenation catalysts: Quarterly report for the period 1 October-31 December 1985, 12:47018 (R;US)
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Separation of dilute hazardous organics by low-pressure composite membranes. Final report, April 1985-December 1986, 12:48432 (R;US)
Organic Solvents
Health-Hazard Evaluation report HETA 84-496-1766, Applied Plastics, Slocum, Rhode Island, 12:48336 (R;US)
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Evaluation of combustion processes for destruction of liquid organic wastes, GA Technologies, Incorporated, 12:48347 (R;US)
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Health-Hazard Evaluation Report HETA 85-195-1768, Dale Electronics, Incorporated, Norfolk, Nebraska, 12:48338 (R;US)
Radiation Monitoring
Health-Hazard Evaluation Report HETA 85-111-1770, Feed Materials Production Center, Fernald, Ohio, 12:47193 (R;US)
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Health-Hazard Evaluation Report HETA 85-150-1767, Warwick Fire Department, Warwick, Rhode Island, 12:48340 (R;US)
Health-Hazard Evaluation Report HETA 86-410-1772, HCFA-Meadows East Building, Baltimore, Maryland, 12:48345 (R;US)
Waste Disposal
Permit guidance manual on unsaturated zone monitoring for hazardous-waste land-treatment units. Final report, 12:48418 (R;US)
Superfund Record of Decision (EPA Region 2): Florence Land Recontouring (FLR) landfill, Florence, Mansfield, and Springfield, New Jersey, June 1986. Final report, 12:48412 (R;US)
Superfund Record of Decision (EPA Region 4): A. l. Taylor site (Valley of the Drums), Bullitt County, Kentucky, June 1986. Final report, 12:48413 (R;US)
Superfund Record of Decision (EPA Region 3): Drake Chemical Site (Phase 2), Lock Haven, Clinton County, Pennsylvania (second remedial action), May 1986. Final report, 12:48445 (R;US)
Superfund Record of Decision (EPA Region 2): Lang Property, Pemberton Township, New Jersey, September 1986. Final report, 12:48447 (R;US)
Superfund Record of Decision (EPA Region 4) Gallaway Ponds Site, Gallaway, Tennessee, September 1986. Final report, 12:48448 (R;US)
Superfund Record of Decision (EPA Region 5): Lake Sandy Jo/M and M landfill, Lake County, Indiana, September 1986. Final report, 12:48414 (R;US)
Superfund Record of Decision (EPA Region 1): Baird and McGuire, Holbrook, Massachusetts, September 1986. Final report, 12:48415 (R;US)
Superfund Record of Decision (EPA Region 2): Marathon Battery Company site, Cold Spring, Putnam County, New York, September 1986. Final report, 12:48449 (R;US)
Superfund Record of Decision (EPA Region 1): Auburn Road Landfill, Londonderry, New Jampshire, September 1986. Final report, 12:48416 (R;US)
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From pollution to prevention: a progress report on waste reduction. Special report, 12:47584 (R;US)
Hazardous waste management strategy in Illinois: Government's role, 12:47707 (BA;US)
Waste-water characterization and hazardous-waste survey, Castle AFB, California. Final report, 22-27 September 1986, 12:48423 (R;US)
Wastes
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Peak-power cost-reduction guidebook. Final report, May 1983-December 1985 (At US Air Force bases), 12:47601 (R;US)
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Waste-water characterization and hazardous-waste survey, Castle AFB, California. Final report, 22-27 September 1986, 12:48423 (R;US)

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Development of a liquid isotonic ration for consumption in an NBC (nuclear, biological, or chemical) environment. Final report, August 1982-September 1983, 12:47796 (R;US)
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Interim medical decontamination handbook preparation. Phase 1: test plan development. Interim report (Final), August 1983-April 1985, 12:47799 (R;US)
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Superfund Record of Decision (EPA Region 3): Bruin Lagoon Site, Bruin Borough, Pennsylvania (second remedial action), September 1986. Final report, 12:48444 (R;US)
Superfund Record of Decision (EPA Region 3): Drake Chemical Site (Phase 2), Lock Haven, Clinton County, Pennsylvania (second remedial action), May 1986. Final report, 12:48445 (R;US)
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For nonradioactive wastes. For radioactive wastes, use NUCLEAR WASTE POLICY ACTS.
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Plans and schedules for implementation of US Nuclear Regulatory Commission responsibilities under the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240), 12:47595 (R;US)
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From pollution to prevention: a progress report on waste reduction. Special report, 12:47584 (R;US)
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Superfund Record of Decision (EPA Region 3): Bruin Lagoon Site, Bruin Borough, Pennsylvania (second remedial action), September 1986. Final report, 12:48444 (R;US)
WASTE PRODUCT UTILIZATION
Characterization, extraction, and reuse of coal-gasification solid wastes. Volume 3. Technical and economic feasibility of bulk utilization and metal recovery for ashes from an integrated coal-gasification facility. Final report, April 1983-June 1986, 12:47059 (R;US)
Investigation of the energy value of automobile shredder residue, 12:47673 (R;US)
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Study of joint use of vehicles for transportation of hazardous and nonhazardous materials. A report to Congress, 12:47585 (R;US)
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Proposed water treatment approach for commercial tar sand wastewaters, 12:47188 (R;US)

Review of toxicity studies performed on an underground coal gasification condensate water, 12:47016 (R;US)
Wet-air oxidation of TS-1S wastewater, 12:47189 (R;US)
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Waste-water characterization and hazardous-waste survey, Castle AFB, California. Final report, 22-27 September 1986, 12:48423 (R;US)

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Migration of hazardous substances through soil. Part 3. Flue-gas desulfurization and fly-ash wastes. Final report, December 1974-July 1977, 12:48403 (R;US)

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Superfund Record of Decision (EPA Region 2): Lang Property, Pemberton Township, New Jersey, September 1986. Final report, 12:48447 (R;US)
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Superfund Record of Decision (EPA Region 5): Lake Sandy Jo/M and M landfill, Lake County, Indiana, September 1986. Final report, 12:48414 (R;US)
Superfund Record of Decision (EPA Region 1): Baird and McGuire, Holbrook, Massachusetts, September 1986. Final report, 12:48415 (R;US)
Superfund Record of Decision (EPA Region 2): Marathon Battery Company site, Cold Spring, Putnam County, New York, September 1986. Final report, 12:48449 (R;US)
Superfund Record of Decision (EPA Region 1): Auburn Road Landfill, Londonderry, New Jampshire, September 1986. Final report, 12:48416 (R;US)

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87-13	NTIS, PC A15/MF A01; 1 (GPO Dep.)	E 1.99: DE88000012	STD -34	12:48900
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87-3	NTIS, PC A14/MF A01; 1 (GPO Dep.)	E 1.99: DE88000449	STD -20d	12:49056
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87-1	NTIS, PC A13/MF A01; 1 (GPO Dep.)	E 1.99: DE87013991	MN -34A	12:48701
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2-1986	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753088	MN -95d	12:47632
13-1986	NTIS (US Sales Only), PC A06; 3	DE87753089	MN -95d	12:47633
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644	NTIS, PC A99; 3	DE87012946	MN -70	12:47207
650	NTIS, PC A12/MF A01; 1 (GPO Dep.)	E 1.99: DE87013865	STD -70	12:47208
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39991	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87012482	MN -34B	12:48551
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40072	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014440	MN -25	12:47855
40089	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87013318	MN -28	12:48170
40105	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014295	MN -34B	12:48552
40106	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014293	MN -25	12:47886
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40200	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014913	MN -34D	12:48747
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52054	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014718	STD -66	12:47335
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52090	NTIS, PC A11/MF A01; 1 (GPO Dep.)	E 1.99: DE88000133	STD -28	12:48180
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8641	NTIS (US Sales Only), PC A02/MF A01	DE87752562	MN -11	12:48538
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8772	NTIS (US Sales Only), PC A02/MF A01	DE87752577	MN -34C	12:48901
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8840	NTIS (US Sales Only), PC A02/MF A01	DE87752568	MN -25	12:47809
8842	NTIS (US Sales Only), PC A02/MF A01	DE87752606	MN -48	12:48492
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8902	NTIS (US Sales Only), PC A02/MF A01	DE87752598	MN -78	12:47446
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8906	NTIS (US Sales Only), PC A02/MF A01	DE87752602	MN -78	12:47464
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153	NTIS (US Sales Only), PC A02/MF A01	DE87752587	MN -11	12:48540
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303	*See* CEA-CONF-8902	DE87752598	MN -78	12:47446
304	*See* CEA-CONF-8903	DE87752599	MN -78	12:47410
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2479-Rev.1	NTIS (US Sales Only), PC A08/MF A01	DE87752575	MN -34D	12:48774
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852050-2	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753078	MN -121	12:47144
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852310-10	NTIS (US Sales Only), PC A02/MF A01; 1	DE87753075	MN -122	12:47146
852455-2	NTIS (US Sales Only), PC A02/MF A01; 1	DE87753072	MN -121	12:47147
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862090-8	NTIS (US Sales Only), PC A02/MF A01; 1	DE87753079	MN -32	12:49169
862090-9	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753077	MN -131	12:47169
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872090-2	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753080	MN -32	12:49170
CONF-840572-	(International symposium on observation of the continental crust through drilling, Tarrytown, NY, USA, 20-25 May 1984)			
Summ.	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87011191	MN -121	12:48545
CONF-841142-	(Symposium on environmental research for actinide elements, Hilton Head Island, SC, USA, 7-11 Nov 1984)			
	NTIS, PC A19/MF A01; 1 (GPO Dep.)	E 1.99: DE86008713	STD -11	12:48408
CONF-8503120-	(Hadronic probes and nuclear interactions conference, Tempe, AZ, USA, 11-14 Mar 1985)			
	AIP Conf. Proc., 133: No. 1, 72-82(15 Sep 1985)			12:48836
	AIP Conf. Proc., 133: No. 1, 83-95(15 Sep 1985)			12:48837
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	AIP Conf. Proc., 133: No. 1, 255-270(15 Sep 1985)			12:48965
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	AIP Conf. Proc., 133: No. 1, 400-401(15 Sep 1985)			12:48969
	AIP Conf. Proc., 133: No. 1, 48-68(15 Sep 1985)			12:48970
	AIP Conf. Proc., 133: No. 1, 378-379(15 Sep 1985)			12:48971
CONF-8503143-	(25. anniversary congress of the South African Association of Physicists in medicine and biology, Capetown, South Africa, 18-22 Mar 1985)			
	See INIS-mf-10956	DE87703269	MN -48	12:48470
CONF-8504161-	(Workshop on polarized antiproton sources, Bodega Bay, CA, USA, 18-21 Apr 1985)			
	AIP Conf. Proc., 145: No. 1, 221-225(20 Jul 1986)			12:48214
	AIP Conf. Proc., 145: No. 1, 154-161(20 Jul 1986)			12:48215
	AIP Conf. Proc., 145: No. 1, 226-228(20 Jul 1986)			12:48216
	AIP Conf. Proc., 145: No. 1, 149-153(20 Jul 1986)			12:48835
CONF-8504313-	(Essays in space science, Greenbelt, MD, USA, 23 Apr 1985)			
	See N-87-24247			12:48558
CONF-8505164-	(Workshop on high brightness, high current, high duty factor ion injectors, San Diego, CA, USA, 21-23 May 1985)			
	AIP Conf. Proc., 139: No. 1, 107-132(25 Apr 1986)			12:48195
	AIP Conf. Proc., 139: No. 1, 207-216(25 Apr 1986)			12:48196
	AIP Conf. Proc., 139: No. 1, 37-44(25 Apr 1986)			12:48217
	AIP Conf. Proc., 139: No. 1, 17-24(25 Apr 1986)			12:48218
	AIP Conf. Proc., 139: No. 1, 185-192(25 Apr 1986)			12:48219
	AIP Conf. Proc., 139: No. 1, 63-78(25 Apr 1986)			12:48220
	AIP Conf. Proc., 139: No. 1, 79-94(25 Apr 1986)			12:48221
CONF-8505191-	(Joint meeting of the plasma/wall interactions and high heat flux materials and component task groups of the Division of Development and Technology, Washington, DC, USA, 21-22 May 1985)			
Summ.	NTIS, PC A18; 3	DE87013324	MN -20c	12:49121
CONF-8505194-	(Conference on characterization of contaminant emissions from indoor sources, Triangle Park, NC, USA, 13-15 May 1985)			
	Atmos. Environ., 21: No. 2, 377-383(1987)			12:48377
CONF-8506356-	(International seminar on Soviet energy, Soderfors, Sweden, 6-7 Jun 1985)			
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CONF-8506360-	(International conference on the formation of semiconductor interfaces, Marseille, France, 10-14 Jun 1985)			
1	*See* LYCEN-8553	DE87752569	MN -4	12:47905
2	*See* LYCEN-8554	DE87752572	MN -34C	12:47906
CONF-850716-	(7. international conference on ion beam analysis, Berlin, F.R. Germany, 7-12 Jul 1985)			
9	*See* LYCEN-8543	DE87752570	MN -4	12:47904
CONF-850721-	(International Europhysics conference on high energy physics, Bari, Italy, 18-24 Jul 1985)			
28	*See* IFVE-OTF-85-170	DE87703251	MN -34D	12:48785
CONF-850813-	(11. international conference on atomic collisions in solids, Washington, DC, USA, 4-9 Aug 1985)			
5	*See* LYCEN-8539	DE87752571	MN -4	12:47939
CONF-8510458-	(International school on nuclear structure, Alushta, Ukrainian SSR, 14-22 Oct 1985)			
	See JINR-D-4-85-851	DE88780001	MN -34C	12:48944
CONF-8510469-	(DEK decontamination workshop, Rez, Czechoslovakia, 29-31 Oct 1985)			
	See INIS-mf-10948	DE87702906	MN -41	12:47215

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CONF-8511150-	(Workshop on triggering, data acquisition and computing for high energy/high luminosity hadron-hadron colliders, Batavia, IL, USA, 11-14 Nov 1985)			
13	*See* DOE/ER/03130-26	E 1.99: DE87014481	MN -28	12:48200
14	*See* DOE/ER/03130-27	E 1.99: DE87014480	MN -28	12:48201
CONF-860189-	(1. national colloquium on paraseismic engineering, Saint-Remy-les-Chevreuse, France, 29-31 Jan 1986)			
2	*See* CEA-CONF-8641	DE87752562	MN -11	12:48538
3	*See* CEA-CONF-8642	DE87752563	MN -11	12:48539
CONF-860311-	(Nuclear power plant maintenance meeting, Salt Lake City, UT, USA, 23-27 Mar 1986)			
16	*See* HEDL-SA-3448-FP	E 1.99: DE87014374	MN -79	12:47452
CONF-860411-	(1. international conference on separations science and technology, New York, NY, USA, 15-17 Apr 1986)			
	Fuel, 66: No. 7, 909-913(Jul 1987)			12:47045
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	Fuel, 66: No. 7, 954-959(Jul 1987)			12:47047
	Fuel, 66: No. 7, 996-1001(Jul 1987)			12:47048
	Fuel, 66: No. 7, 1002-1007(Jul 1987)			12:47049
CONF-860421-	(2. international conference on fusion reactor materials (ICFRM-2), Chicago, IL, USA, 13-17 Apr 1986)			
	J. Nucl. Mater., 149: No. 1, 21-28(Jun 1987)			12:47851
CONF-860594-	(ASM international trends in welding research meeting, Gatlinburg, TN, USA, 18-22 May 1986)			
12	*See* GKSS-86/E/62		ND -25	12:47818
CONF-8605110-	(OPTO '86 conference, Paris, France, 13-15 May 1986)			
6	*See* CEA-CONF-8819	DE87752566	MN -25	12:47889
CONF-8605114-	(Properties and applications of metal hydrides, Maubuisson, France, 25-30 May 1986)			
	J. Less-Common Met., 131: 131(15 Mar 1987)			12:47257
	J. Less-Common Met., 131: 131(15 Mar 1987)			12:47258
	J. Less-Common Met., 131: 131(15 Mar 1987)			12:47259
CONF-8605270-	(Franco-American workshop on practice of earthquake engineering, Paris, France, 26-28 May 1986)			
1	*See* CEA-CONF-8815	DE87752564	MN -11	12:48092
CONF-8605271-	(Congress on scanning electron microscopy, New Orleans, LA, USA, 5-10 May 1986)			
1	*See* CEA-CONF-8818	DE87752565	MN -25	12:47888
CONF-8605275-	(VGB special meeting on Yugoslavia, Bled, Yugoslavia, 14-15 May 1986)			
	See INIS-mf-10706	DE87752788	MN -97d	12:47345
CONF-860652-	(7. topical meeting on the technology of fusion energy, Reno, NV, USA, 15-19 Jun 1986)			
33	*See* HEDL-SA-3454-FP	E 1.99: DE87014373	MN -79	12:47472
34	*See* HEDL-SA-3476	DE87014372	MN -20c	12:49132
CONF-8606111-	(6. international symposium on radiopharmaceutical chemistry, Boston, MA, USA, 29 Jun-3 Jul 1986)			
	J. Labelled Compd. Radiopharm., 23: No. 10-1, 1280-1283(Oct-Dec 1986)			12:47252
	J. Labelled Compd. Radiopharm., 23: No. 10-12, 1386-1388(Oct-Dec 1986)			12:47253
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	J. Labelled Compd. Radiopharm., 23: No. 10-12, 1377(Oct-Dec 1986)			12:48483
	J. Labelled Compd. Radiopharm., 23: No. 10-12, 1397-1399(Oct-Dec 1986)			12:48484
	J. Labelled Compd. Radiopharm., 23: No. 10-12, 1400-1402(Oct-Dec 1986)			12:48485
	J. Labelled Compd. Radiopharm., 23: No. 10-12, 1403-1404(Oct-Dec 1986)			12:48486
CONF-8606319-	(2. NAWG meeting of the C.E.C., Interlaken, Switzerland, 16-20 Jun 1986)			
1	*See* CEA-CONF-8782	DE87752605	MN -70	12:47209
CONF-8606334-	(Workshop on energy from municipal waste: opportunities for the Southwest, Austin, TX, USA, 23-25 Jun 1986)			
	See ANL/CNSV-TM-173	E 1.99: DE87014258	MN -95e	12:47608
CONF-8606337-	(Star formation in galaxies, Pasadena, CA, USA, 16-19 Jun 1986)			
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CONF-860701-	(23. international conference on high-energy physics, Berkeley, CA, USA, 16-23 Jul 1986)			
85	*See* LAL-86-29	DE87752584	MN -34D	12:48766
CONF-8607116-	(16. annual anomalous absorption conference, Lake Luzerne, NY, USA, 13-18 Jul 1986)			
2-Vugraphs	*See* DOE/DP/40200-33	E 1.99: DE87014465	MN -21	12:49123
3-Vugraphs	*See* DOE/DP/40200-34	E 1.99: DE87014464	MN -21	12:49124
CONF-860806-	(8. international conference on solid state dosimetry, Oxford, UK, 26-29 Aug 1986)			
	Radiat. Prot. Dosim., 17: No. 1-4, 329-331(1986)			12:48273
	Radiat. Prot. Dosim., 17: No. 1-4, 437-441(1986)			12:48990
CONF-860874-	(2. international photovoltaic science and engineering conference, Beijing, China, 19-22 Aug 1986)			
3	*See* SV-UL-FUD-B-86-17	DE87753120	MN -63	12:47311
CONF-860880-	(30. SPIE technical symposium on optics and optoelectronic engineering, San Diego, CA, USA, 17-22 Aug 1986)			
56	*See* N-87-24378			12:48286
CONF-8608185-	(NAT ASI meeting: the galaxy, Cambridge, UK, 4-15 Aug 1986)			
1	*See* CEA-CONF-8829	DE87752567	MN -34B	12:48553
CONF-8608192-	(Summer workshop on antiproton beams in the 2-10 GeV/c range, Upton, NY, USA, 18-22 Aug 1986)			
	See BNL-52082	E 1.99: DE87012851	STD -28	12:48171
CONF-8608196-	(Seminar on the ergonomics of locomotives and free-steered vehicles, Bretby, UK, 20 Aug 1986)			
	See IOM-TM-87-05			12:47093
CONF-860908-	(Operability of nuclear power systems in normal and adverse environments meeting, Albuquerque, NM, USA, 29 Sep-3 Oct 1986)			
43	*See* CEA-CONF-8903	DE87752599	MN -78	12:47410
44	*See* CEA-CONF-8904	DE87752600	MN -78	12:47462
CONF-860911-	(192. American Chemical Society national meeting, Anaheim, CA, USA, 7-12 Sep 1986)			
Pt.1	*See* NUREG/CP-0078	DE87900833	MN -80	12:47483
CONF-860952-	(2. international aerosol conference, Berlin, F.R. Germany, 22-26 Sep 1986)			
4	*See* CEA-CONF-8902	DE87752598	MN -78	12:47446
CONF-860953-	(International conference on vacancies and interstitials in metals and alloys, Berlin, F.R. Germany, 14-19 Sep 1986)			
17	*See* CEA-CONF-8840	DE87752568	MN -25	12:47809
CONF-860977-	(Antiproton '86: European symposium on nucleon-antinucleon interactions, Thessalonika, Greece, 1-5 Sep 1986)			
3	*See* LAL-86-37	DE87752585	MN -34D	12:48767
CONF-860998-	(Investigators' meeting on microbiology of deep subsurface environments, Germantown, MD, USA, 22-24 Sep 1986)			
Summ.	*See* DOE/ER-0312	E 1.99: DE87013094	MN -11	12:48402
CONF-8609105-	(Annual meeting of the Human Factors Society, Dayton, OH, USA, 30 Sep-3 Oct 1986)			
8	*See* HEDL-SA-3563-FP	E 1.99: DE87014364	MN -79	12:47453
CONF-8609297-	(18. summer school on particle physics, Gif-sur-Yvette, France, 8-12 Sep 1986)			
1	*See* LAL-86-43	DE87752586	MN -34D	12:48826
CONF-8609298-	(ESNA congress, Tel Aviv, Israel, 21-28 Sep 1986)			
1	*See* CEA-CONF-8842	DE87752606	MN -48	12:48492
CONF-861021-	(7. European photovoltaic solar energy conference, Sevilla, Spain, 27-31 Oct 1986)			
2	*See* SV-UL-FUD-B-1986-18	DE87753121	MN -63	12:47312
CONF-8610136-	(SIPRI/CIIPS study on a comprehensive test ban, Ottawa, Canada, 23-25 Oct 1986)			
4	*See* UCRL-95313	E 1.99: DE87009737	MN -35	12:47802
CONF-8610173-	(11. conference on cyclotrons and their applications, Tokyo, Japan, 13-17 Oct 1986)			
17	*See* GANIL-A-86-09	DE87752604	MN -28	12:48182
CONF-8610253-	(4. Franco-Japanese colloquium on nuclear spectroscopy, Seillac, France, 7-11 Oct 1986)			
3	*See* CEA-CONF-8854	DE87752607	MN -34	12:48173
CONF-8610289-	(Fission meeting, Arcachon, France, 14-17 Oct 1986)			
1	*See* IPNO-DRE-86-22	DE87752583	MN -34C	12:48919
CONF-8610290-	(Symposium on programme for the inspection of steel components, Varese, Italy, 13-15 Oct 1986)			
1	*See* CEA-CONF-8905	DE87752601	MN -80	12:47463
CONF-8610291-	(International meeting of nuclear reactor safety committees, Racine, PA, USA, 20-23 Oct 1986)			
1	*See* CEA-CONF-8906	DE87752602	MN -78	12:47464
CONF-8610332-	(Hans Bethe's birthday conference on supernovae, Ithaca, NY, USA, 19-21 Oct 1986)			
1	*See* BNL-40105	E 1.99: DE87014295	MN -34B	12:48552

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CONF-8610334-	(Technical committee meeting on properties of materials for water reactor fuel elements and methods of measurement, Vienna, Austria, 13-16 Oct 1986)				
	See IWGFPT-26		DE87900925	MN -78	12:47406
CONF-861110-	(American Physical Society Plasma Physics Division meeting, Baltimore, MD, USA, 3-7 Nov 1986)				
8	*See* DOE/DP/40200-39	E 1.99:	DE87014463	MN -21	12:49125
9-Vugraphs	*See* DOE/DP/40200-41	E 1.99:	DE87014649	MN -21	12:49126
CONF-861123-	(CEC/CEA international workshop on age-related factors in radionuclide metabolism and dosimetry, Angers, France, 26-28 Nov 1986)				
8	*See* CEA-CONF-8890		DE87752597	MN -48	12:48496
CONF-861162-	(14. ATSR symposium on radiation protection problems encountered in major developments in new techniques and technologies, Paris, France, 26-28 Nov 1986)				
1	*See* CEA-CONF-8908		DE87752603	MN -80	12:47465
CONF-8611138-	(Saturne workshop, La Londe-les-Maures, France, 10-14 Nov 1986)				
2	*See* CEA-CONF-8772		DE87752577	MN -34C	12:48901
3	*See* CEA-CONF-8873		DE87752608	MN -37	12:48229
CONF-8611168-	(Workshop on identification of ionized products and dosimetry of treatment, Neuherberg, F.R. Germany, 17-21 Nov 1986)				
1	*See* CEA-CONF-8883		DE87752609	MN -23	12:48493
CONF-861211-	(American Society of Mechanical Engineers winter meeting, Anaheim, CA, USA, 7-12 Dec 1986)				
28	*See* Y/DX-699	E 1.99:	DE87014050	MN -38	12:48103
CONF-870132-	(OE/LASE '87, Los Angeles, CA, USA, 11-16 Jan 1987)				
17	*See* EGG-M-32286	E 1.99:	DE87014883	MN -25	12:47897
CONF-870152-	(Workshop on opportunities for atomic physics using slow, highly-charged ions, Argonne, IL, USA, 12-13 Jan 1987)				
	See ANL-PHY-87-1	E 1.99:	DE87013991	MN -34A	12:48701
CONF-870158-	(Workshop on proton and neutral meson physics at intermediate energies, Los Alamos, NM, USA, 8-10 Jan 1987)				
2	*See* LA-UR-87-2853	E 1.99:	DE87014757	MN -37	12:48261
CONF-870187-	(International cryogenic materials conference, St. Charles, IL, USA, 10-12 Jan 1987)				
1	*See* LBL-22817	E 1.99:	DE87014084	MN -25	12:47826
CONF-870188-	(Proposals for ORNL support to Tiber LLNL, Livermore, CA, USA, 27 Jan 1987)				
1	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99:	DE87011657	MN -20	12:49115
CONF-870260-	(International workshop hadron facility technology, Santa Fe, NM, USA, 2-5 Feb 1987)				
14	*See* LA-UR-87-2766	E 1.99:	DE87014772	MN -28	12:48227
CONF-870272-	(American Institute of Metallurgical Engineers annual meeting: light metals session, Denver, CO, USA, 22-26 Feb 1987)				
7-Vugraphs	*See* HEDL-SA-3379	E 1.99:	DE87010711	MN -20c	12:49131
CONF-870278-	(4. family of quarks and leptons international symposium, Santa Monica, CA, USA, 26-28 Feb 1987)				
6	*See* SLAC-PUB-4334	E 1.99:	DE87014311	MN -34D	12:48829
CONF-870334-	(Workshop on results and perspectives in particle physics, La Thuile, Italy, 1-7 Mar 1987)				
3	*See* SLAC-PUB-4361		DE87014313	MN -34D	12:48830
CONF-870395-	(American Institute of Astronautics and Aeronautics, National Aeronautics and Space Administration and U.S. Air Force (AIAA/NASA/USAF) symposium on automation, robotics and advanced computing for the N, Arlington, VA, USA, 9-11 Mar 1987)				
	AIAA Pap., 13(Mar 1987)				12:49222
CONF-870396-	(Lunar and planetary science conference, Houston, TX, USA, 16-20 Mar 1987)				
5	*See* BNL-39991	E 1.99:	DE87012482	MN -34B	12:48551
CONF-8703121-	(Telemark IV - neutrino mass and neutrino astrophysics, Ashland, WI, USA, 16-18 Mar 1987)				
6	NTIS, PC A02; 3		DE87014069	MN -34C	12:48887
CONF-8703149-	(ICFA workshop on low emittance e/sup -/ -e/sup +/ beams, Upton, NY, USA, 20-25 Mar 1987)				
	See BNL-52090	E 1.99:	DE88000133	STD -28	12:48180
6	*See* SLAC-PUB-4295	E 1.99:	DE87014607	MN -28	12:48176
CONF-870438-	(Spring meeting of the Materials Research Society, Anaheim, CA, USA, 21-25 Apr 1987)				
34	*See* N-87-25017				12:47861
35	*See* LBL-23556	E 1.99:	DE87014687	MN -28	12:48209
CONF-870466-	(International conference on environmental degradation of engineering materials, University Park, PA, USA, 13-15 Apr 1987)				
5	*See* N-87-24007				12:47830

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CONF-8704168-	(Workshop on particle methods in fluid dynamics and plasma physics, Los Alamos, NM, USA, 13-15 Apr 1987)			
2	*See* LA-UR-87-2613	E 1.99: DE87014742	MN -34	12:48736
3	*See* LA-UR-87-2897	E 1.99: DE87014745	MN -34	12:48739
CONF-8704175-	(International conference on security documents for the 21st century, San Diego, CA, USA, 1-3 Apr 1987)			
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014569	MN -13	12:49174
CONF-8704204-	(8. workshop on grand unifications, Syracuse, NY, USA, 16-18 Apr 1987)			
1	*See* SLAC-PUB-4324	DE87014608	MN -34D	12:48861
CONF-870505-	(32. international gas turbine conference and exhibition, Anaheim, CA, USA, 31 May-4 Jun 1987)			
6	*See* N-87-23934			12:48128
CONF-870528-	(19. IEEE photovoltaic specialists conference, New Orleans, LA, USA, 4-8 May 1987)			
20	*See* N-87-23901			12:47309
CONF-870543-	(2. workshop on experiments and detectors for relativistic heavy ion collider, Berkeley, CA, USA, 25-29 May 1987)			
4	*See* UCRL-97269	E 1.99: DE87014345	MN -34C	12:48955
6	*See* UCRL-97270	E 1.99: DE87014352	MN -34C	12:48956
CONF-870552-	(5. conference on real-time computer applications in nuclear, particle, and plasma physics, San Francisco, CA, USA, 11-15 May 1987)			
25	*See* DOE/ER/03130-36	E 1.99: DE87014475	MN -32	12:48230
CONF-870558-	(19. international electric propulsion conference, Colorado Springs, CO, USA, 11-13 May 1987)			
	AIAA Pap., 7(May 1987)			12:47461
	AIAA Pap., 7(May 1987)			12:48106
	AIAA Pap., 12(May 1987)			12:48107
CONF-870584-	(Society of Photo-Optical Instrumentation Engineers conference, Orlando, FL, USA, 17-22 May 1987)			
12	*See* UCRL-95349	E 1.99: DE87011552	MN -37	12:48291
CONF-8705103-	(Fossil energy materials program conference, Oak Ridge, TN, USA, 19-21 May 1987)			
11	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87013885	MN -114	12:47857
CONF-8705129-	(Workshop on lattice gauge theory using parallel processors, Beijing, China, 21 May-2 Jun 1987)			
2	*See* LA-UR-87-2464	E 1.99: DE87013164	MN -34D	12:48854
CONF-8705163-	(From colliders to supercolliders workshop, Madison, WI, USA, 11-22 May 1987)			
7	*See* LBL-23645	E 1.99: DE88000211	MN -34D	12:48827
CONF-8705168-	(Workshop on competing interactions and microstructures: statics and dynamics, Los Alamos, NM, USA, 5-8 May 1987)			
3	*See* LA-UR-87-2636	E 1.99: DE87014736	MN -38	12:47899
4	*See* LA-UR-87-2618	E 1.99: DE87014739	MN -34A	12:48997
CONF-8705183-	(4. international precision engineering seminar, Cranfield, UK, 11-14 May 1987)			
1	*See* UCRL-96159	E 1.99: DE87014242	MN -25	12:47841
CONF-8705184-	(5. international conference on high temperature and energy-related materials, Rome, Italy, 25-29 May 1987)			
1	*See* LBL-23614	DE87014128	MN -25	12:47989
CONF-8705188-	(25. winter school on nuclear structure, Zakopane, Poland, 1 May 1987)			
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87012925	MN -34C	12:48902
CONF-8705189-	(Conference on relativistic fluids, Noto, Italy, 1 May 1987)			
1	*See* LA-UR-87-2925	E 1.99: DE87014743	MN -34C	12:48951
CONF-8705190-	(SIAM conference on optimization, Houston, TX, USA, 18-20 May 1987)			
Absts.	*See* DOE/ER/25034-1	DE87014493	MN -32	12:49180
CONF-8705191-	(Short course on numerical optimization, Houston, TX, USA, 17 May 1987)			
Absts.	*See* DOE/ER/25034-1	DE87014493	MN -32	12:49180
CONF-870601-	(Annual meeting of the American Nuclear Society, Dallas, TX, USA, 7-12 Jun 1987)			
22	*See* UCRL-96898	E 1.99: DE87013511	MN -20	12:49106
CONF-870606-	(American Association of Petroleum Geologists annual meeting, Los Angeles, CA, USA, 7-10 Jun 1987)			
	AAPG Bull., 71: No. 5, 556(May 1987)			12:47128
	AAPG Bull., 71: No. 5, 571(May 1987)			12:47129
	AAPG Bull., 71: No. 5, 585(May 1987)			12:47130
	AAPG Bull., 71: No. 5, 585(May 1987)			12:47131
CONF-870610-	(5. national synchrotron radiation instrumentation conference, Madison, WI, USA, 21-25 Jun 1987)			
11	*See* LA-UR-87-2837	E 1.99: DE87014761	MN -37	12:48284
CONF-870622-	(19. fluid dynamics, plasma dynamics, and laser conference, Honolulu, HI, USA, 8-10 Jun 1987)			
	AIAA J., 12(Jun 1987)			12:48745

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CONF-870632-	(International Europhysics conference on high energy physics, Uppsala, Sweden, 25 Jun-1 Jul 1987)				
2	*See* SLAC-PUB-4371		DE87014316	MN -28	12:48267
3	*See* SLAC-PUB-4373		DE87014606	MN -34D	12:48268
4	*See* BNL-40200	E 1.99:	DE87014913	MN -34D	12:48747
CONF-870644-	(78. annual meeting of the American Society of Biological Chemists conference, Philadelphia, PA, USA, 7-11 Jun 1987)				
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2172(1 May 1987)				12:48454
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2142(1 May 1987)				12:48455
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2167(1 May 1987)				12:48456
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2266(1 May 1987)				12:48457
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2233(1 May 1987)				12:48458
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2257(1 May 1987)				12:48459
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2133(1 May 1987)				12:48460
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2126(1 May 1987)				12:48461
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2135(1 May 1987)				12:48462
	Fed. Proc., Fed. Am. Soc. Exp. Biol., 46: No. 6, 2143(1 May 1987)				12:48531
CONF-870649-	(American Society for Testing and Materials, Cincinnati, OH, USA, 21-26 Jun 1987)				
2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014057	MN -13	12:49150
CONF-870669-	(Society of Women Engineers national convention, Kansas City, MO, USA, 24-26 Jun 1987)				
2	*See* EGG-M-37586	E 1.99:	DE87014882	MN -38	12:48091
CONF-870677-	(6. IMACS international symposium on computer methods for partial differential equations, Bethlehem, PA, USA, 23-26 Jun 1987)				
9	*See* N-87-24549				12:48088
CONF-870691-	(Review of progress in quantitative NDE, Williamsburg, VA, USA, 21-26 Jun 1987)				
2	*See* RFP-4121		DE87011051	MN -25	12:48141
CONF-870697-	(20. ASTM's national fracture mechanics conference: prospectives and directions, Leheigh, PA, USA, 23-25 Jun 1987)				
2	*See* HEDL-SA-3474-FP	E 1.99:	DE87014377	MN -25	12:47819
CONF-8706113-	(6. Adriatic international conference on nuclear physics, Dubrovnik, Yugoslavia, 15-19 Jun 1987)				
6	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014948	MN -34C	12:48878
CONF-8706147-	(Workshop on new developments in particle acceleration techniques, Orsay, France, 29 Jun-4 Jul 1987)				
5	*See* SLAC-PUB-4295	E 1.99:	DE87014607	MN -28	12:48176
6	*See* LA-UR-87-2714	E 1.99:	DE87014727	MN -28	12:48191
7	*See* BNL-40224	E 1.99:	DE87014909	MN -28	12:48199
CONF-8706157-	(23. AIAA/SAE/ASME/ASEE joint propulsion conference, San Diego, CA, USA, 29 Jun-2 Jul 1987)				
5	*See* N-87-23692				12:47459
6	*See* N-87-24525				12:47460
CONF-8706166-	(International symposium on medium energy physics, Beijing, China, 23-27 Jun 1987)				
3	*See* LA-UR-87-2716	E 1.99:	DE87014726	MN -34C	12:48950
CONF-8706176-	(Workshop and symposium on the physics of low energy, stored, and trapped particles, Stockholm, Sweden, 14-18 Jun 1987)				
3	NTIS, PC A02; 3		DE87014792	MN -34A	12:48713
CONF-8706192-	(Conference on undulator magnets for synchrotron radiation and free electron lasers, Trieste, Italy, 23-26 Jun 1987)				
1	*See* LA-UR-87-2653	E 1.99:	DE87014734	MN -28	12:48208
2	*See* UCRL-97210	E 1.99:	DE87014721	MN -28	12:48177
CONF-8706193-	(International conference on nuclear shapes, Crete, Greece, 28 Jun-4 Jul 1987)				
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014564	MN -34C	12:48890
2	*See* DOE/ER/04052-105	E 1.99:	DE87014004	MN -34C	12:48903
CONF-8706199-	(CRDEC scientific conference on obscuration and aerosol research, Aberdeen, MD, USA, 1 Jun 1987)				
1	*See* LA-UR-87-2851	E 1.99:	DE87014758	MN -34	12:49040
CONF-8706200-	(CEBAF summer workshop, Newport News, VA, USA, 22-26 Jun 1987)				
1	*See* SLAC-PUB-4386		DE87014610	MN -34C	12:48770
2	*See* BNL-40066	E 1.99:	DE87014292	MN -34C	12:48896
3	*See* LA-UR-87-2633	E 1.99:	DE87014738	MN -34C	12:48949

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CONF-8706201-	(101. International Astronomics Union colloquium on interaction of supernova remnants with the interstellar medium, Penticon, Canada, 8-12 Jun 1987)				
1	*See* UCRL-95525	E 1.99:	DE87014241	MN -34B	12:48687
CONF-870713-	(28. INMM annual meeting on safeguards: a mature technology, Newport Beach, CA, USA, 12-15 Jul 1987)				
54	*See* HEDL-SA-3669-FP	E 1.99:	DE87014379	MN -15	12:47244
58	*See* MLM-3448(OP)		DE87013745	MN -16	12:47247
CONF-870719-	(2. international conference on phase transformations in solids, Cambridge, UK, 6-10 Jul 1987)				
4	*See* LBL-23810	E 1.99:	DE87014682	MN -25	12:47828
CONF-870725-	(22. annual meeting of the Microbeam Analysis Society, Kailua-Kona, HI, USA, 13-17 Jul 1987)				
10	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87012532	MN -25	12:47856
11	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87012252	MN -25	12:47810
CONF-870731-	(4. international workshop on positrons in gases, London, UK, 16-17 Jul 1987)				
1	*See* UCRL-97264	E 1.99:	DE87014355	MN -34A	12:49000
CONF-870733-	(Pacific workshop and meeting on analytical electron microscopy, Kona, HI, USA, 12-17 Jul 1987)				
12	*See* LBL-23739	E 1.99:	DE87014118	MN -34A	12:47903
CONF-870753-	(5. topical conference of the American Physical Society on shockwaves in condensed matter, Monterey, CA, USA, 20-23 Jul 1987)				
71	*See* UCRL-96527		DE87014343	MN -25	12:47913
74	*See* SAND-87-0727C		DE87013727	MN -34	12:48142
75	*See* SAND-87-0937C		DE87013725	MN -25	12:47862
76	*See* UCRL-96769	E 1.99:	DE88000226	MN -34	12:47842
CONF-870780-	(34. international field emission symposium, Osaka, Japan, 13-18 Jul 1987)				
2	*See* SAND-87-1206C	E 1.99:	DE87014644	MN -25	12:47840
3	*See* SAND-87-1205C	E 1.99:	DE87014851	MN -34A	12:47994
CONF-870783-	(Radiation effects in insulators-4 conference, Lyon, France, 6-10 Jul 1987)				
4	*See* SAND-87-1717C	E 1.99:	DE87013996	MN -25	12:47911
CONF-870791-	(Annual health physics summer school, Pocatello, ID, USA, 12-17 Jul 1987)				
2	*See* DOE/ER/60592-2	E 1.99:	DE87013659	MN -11	12:48318
3	*See* DOE/ER/60592-3		DE87013660	MN -11	12:48319
CONF-870796-	(18. biennial carbon conference, Worcester, MA, USA, 19-24 Jul 1987)				
2	*See* N-87-24563				12:47909
CONF-8707101-	(International conference of glass and glass-ceramics, Kyoto, Japan, 12-15 Jul 1987)				
1	*See* DOE/DP/40200-57	E 1.99:	DE87014467	MN -21	12:48136
CONF-8707102-	(Workshop on transferring X-ray lithography synchrotron (XLS) technology to industry, Upton, NY, USA, 8 Jul 1987)				
Summ.	*See* BNL-52096	E 1.99:	DE87014301	STD -28	12:48172
CONF-8707105-	(Reversed field pinch workshop, Los Alamos, NM, USA, 13-16 Jul 198/)				
1	*See* LA-UR-87-2875	E 1.99:	DE87014750	MN -20f	12:49135
CONF-8707106-	(INTOR workshop, Vienna, Austria, 13-24 Jul 1987)				
1	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014056	MN -20	12:49122
CONF-870802-	(194. American Chemical Society national meeting, New Orleans, LA, USA, 30 Aug-4 Sep 1987)				
11	*See* DP-MS-87-18	E 1.99:	DE87012921	MN -4	12:47936
12	*See* DOE/ER/45107-6		DE87014431	MN -4	12:47892
16	*See* BNL-40072	E 1.99:	DE87014440	MN -25	12:47855
CONF-870804-	(22. intersociety energy conversion engineering conference, Philadelphia, PA, USA, 10-14 Aug 1987)				
37	*See* N-87-24029				12:47564
38	*See* N-87-24838				12:47565
39	*See* N-87-24026				12:47313
CONF-870806-	(6. conference on the computation of electromagnetic fields, Graz, Austria, 25-28 Aug 1987)				
2	*See* LA-UR-87-2722	E 1.99:	DE87014725	MN -34	12:48998
CONF-870811-	(Energy conservation program evaluation: practical methods and useful results, Chicago, IL, USA, 19-21 Aug 1987)				
8	*See* PNL-SA-15218	E 1.99:	DE88000077	MN -95	12:47704
CONF-870830-	(AIAA aerodynamics flight mechanics conference, Monterey, CA, USA, 17-19 Aug 1987)				
2-FP	*See* SAND-86-2875C-FP	E 1.99:	DE87014651	MN -38	12:48099
CONF-870832-	(Topical meeting on artificial intelligence and other innovative computer applications in the nuclear industry, Snowbird, UT, USA, 31 Aug-2 Sep 1987)				
3	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014410	MN -80	12:47439
CONF-870856-	(Conference on nondestructive testing of high performance ceramics, Boston, MA, USA, 25-27 Aug 1987)				
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013550	MN -25	12:48134
2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014417	MN -25	12:48135

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CONF-870873-	(18. conference on low temperature physics, Kyoto, Japan, 20-26 Aug 1987)				
12	*See* BNL-40196		DE87014398	MN -34	12:49007
13	*See* LBL-23493		DE87014678	MN -25	12:47902
14	*See* LA-UR-87-2804		DE87014767	MN -34	12:48737
CONF-870881-	(18. conference on superconductivity in highly correlated fermion systems, Sendai, Japan, 31 Aug-3 Sep 1987)				
1	*See* LBL-23872	E 1.99:	DE87014680	MN -25	12:47859
CONF-8708101-	(6. international symposium on capture gamma-ray spectroscopy, Leuven, Belgium, 31 Aug-4 Sep 1987)				
9	*See* BNL-40148	E 1.99:	DE87014918	MN -34C	12:48888
CONF-8708104-	(Conference on solid state amorphizing transformation, Los Alamos, NM, USA, 10-13 Aug 1987)				
3	*See* LA-UR-87-2873	E 1.99:	DE87014751	MN -25	12:47901
CONF-8708110-	(31. SPIE annual international technical symposium on optical and optoelectronic applied science and engineering, San Diego, CA, USA, 16-21 Aug 1987)				
8	*See* LA-UR-87-2679	E 1.99:	DE87014732	MN -38	12:47900
9	*See* LA-UR-87-2746	E 1.99:	DE87014722	MN -21	12:49088
10	*See* LA-UR-87-2712		DE87014728	MN -37	12:48283
11	*See* LA-UR-87-2807	E 1.99:	DE87014764	MN -25	12:47825
12	*See* UCRL-96280		DE87013110	MN -37	12:48292
13	*See* LA-UR-87-2370	E 1.99:	DE87013158	MN -37	12:48260
CONF-8708117-	(Neutron scattering symposium on advances and applications, Sydney, Australia, 8-10 Aug 1987)				
3	*See* BNL-40243	E 1.99:	DE87014914	MN -4	12:47887
CONF-8708118-	(13. international conference on photochemistry, Budapest, Hungary, 9-14 Aug 1987)				
1	*See* DOE/ER/45107-5		DE87014432	MN -4	12:47891
CONF-8708122-	(Dynamics of ordering processes in condensed matter, Kyoto, Japan, 27-30 Aug 1987)				
1	*See* LA-UR-87-2702	E 1.99:	DE87014729	MN -25	12:47824
CONF-8708123-	(International conference on nuclear structure through static and dynamic moments, Melbourne, Australia, 25-28 Aug 1987)				
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014408	MN -34C	12:48891
CONF-8708125-	(Thermochemistry of alloys conference, Kiel, F.R. Germany, 1 Aug 1987)				
1	*See* BNL-40178	E 1.99:	DE87014399	MN -25	12:47808
CONF-8708128-	(International symposium on computational fluid dynamics and international conference on computational techniques and applications, Sydney, Australia, 24-27 Aug 1987)				
1	*See* LA-UR-87-2842	E 1.99:	DE87014760	MN -32	12:49186
CONF-8708131-	(EHPRG conference, Potsdam, German D.R., 25-27 Aug 1987)				
1	*See* LA-UR-87-2921	E 1.99:	DE87014744	MN -34	12:48999
CONF-8708136-	(Artificial intelligence and other innovative computer applications in the nuclear industry, Sun Valley, ID, USA, 31 Aug-2 Sep 1987)				
1	*See* WINCO-11354	E 1.99:	DE88000350	STD -2	12:48293
CONF-870903-	(International Solar Energy Society international congress on solar energy, Hamburg, F.R. Germany, 13-18 Sep 1987)				
1	*See* SAND-87-1241C	E 1.99:	DE87014172	MN -61D	12:47315
CONF-870908-	(Course and workshop on physics of mirrors, reversed field pinches and compact tori, Varenna, Italy, 1-11 Sep 1987)				
4	*See* LA-UR-87-2830	E 1.99:	DE87014762	MN -20g	12:49089
CONF-870937-	(6. international conference on heavy metals in the environment, New Orleans, LA, USA, 15-18 Sep 1987)				
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87007014	MN -11	12:48315
CONF-870948-	(American Nuclear Society topical meeting on the integrated spent fuel and HLW management system, Albuquerque, NM, USA, 27 Sep-1 Oct 1987)				
1	*See* SAND-87-0089C	E 1.99:	DE87014895	MN -71	12:47203
CONF-870961-	(4. symposium on containment of underground nuclear explosions, Colorado Springs, CO, USA, 21-24 Sep 1987)				
2	*See* SAND-87-2301C	E 1.99:	DE87014847	MN -45	12:48298
3	*See* SAND-87-2302C	E 1.99:	DE87014848	MN -45	12:48299
Absts.	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000059	MN -2	12:48303
CONF-870965-	(International conference on chemistry and migration behavior of actinides and fission products in the geosphere, Munich, F.R. Germany, 14-18 Sep 1987)				
1	*See* LA-UR-87-2644	E 1.99:	DE87014735	MN -11	12:48404
CONF-870970-	(5. international conference on nuclei far from stability, Lake Rosseau, Canada, 14-19 Sep 1987)				
2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014796	MN -34D	12:48889
3	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014797	MN -34C	12:48886

Report Number	Availability Source	File Number		Distribution Category	Abstract Number
CONF-870971-	(Geostatistical sensitivity and uncertainty methods for groundwater flow and radionuclide transport modeling conference, San Francisco, CA, USA, 15-17 Sep 1987)				
1	*See* DP-MS-87-61	E 1.99:	DE87014437	MN -11	12:47214
CONF-870984-	(46. session of the International Statistical Institute, Tokyo, Japan, 8-16 Sep 1987)				
1-Summ.	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87010609	MN -32	12:49171
2	NTIS, PC A02; 3		DE87010617	MN -32	12:49172
CONF-8709110-	(9. international free-electron laser conference, Williamsburg, VA, USA, 14-18 Sep 1987)				
2	*See* LA-UR-87-2882	E 1.99:	DE87014748	MN -28	12:48115
CONF-8709121-	(1. workshop on process-related electrically active defects in semiconductor-insulator systems, Research Triangle Park, NC, USA, 1-2 Sep 1987)				
1	*See* BNL-40106	E 1.99:	DE87014293	MN -25	12:47886
CONF-8709122-	(Specialists' meeting on data for decay heat predictions, Studsvik, Sweden, 7-10 Sep 1987)				
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014412	MN -78	12:47466
CONF-8709123-	(NASIG meeting, Truckee, CA, USA, 21-22 Sep 1987)				
1	*See* SAND-87-1380C	E 1.99:	DE87013929	MN -32	12:49216
CONF-8709124-	(Symposium on low temperature physics, Hsin-chu, Taiwan, 7-8 Sep 1987)				
1-Draft	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014794	MN -34	12:49008
CONF-8709125-	(IUTAM symposium on vortex motion, Tokyo, Japan, 28-30 Sep 1987)				
1	*See* LA-UR-87-2850		DE87014759	MN -34	12:48738
CONF-871004-	(International conference on the utilization of multipurpose research reactors and related international co-operation, Grenoble, France, 19-23 Oct 1987)				
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014563	MN -34C	12:48973
CONF-871007-	(Symposium on fusion engineering, Monterey, CA, USA, 12-16 Oct 1987)				
1	*See* DOE/ET/51013-214	E 1.99:	DE87013942	MN -20	12:49128
CONF-871009-	(American Society of Lubrication Engineers and the American Society of Mechanical Engineers lube conference, San Antonio, TX, USA, 5-8 Oct 1987)				
2	*See* N-87-24565				12:47041
CONF-871013-	(5. SMORN: international conference on reactor noise, Munich, F.R. Germany, 12-16 Oct 1987)				
3	*See* DOE/NE/37959-8		DE87013658	MN -80	12:47441
4	NTIS, PC A02; 3		DE87014058	MN -79	12:47440
CONF-871024-	(Annual meeting of Geothermal Resources Council, Sparks, NV, USA, 12-16 Oct 1987)				
16	*See* UCRL-97177	E 1.99:	DE87014551	MN -66	12:47333
17	*See* LBL-23721	E 1.99:	DE87014114	MN -66a	12:47334
CONF-871028-	(Instrument Society of America international conference and exhibit, Anaheim, CA, USA, 5-8 Oct 1987)				
4	*See* RFP-4104	E 1.99:	DE87013381	MN -32	12:49215
CONF-871061-	(33. annual bioassay analytical and environmental radiochemistry conference, Livermore, CA, USA, 6-8 Oct 1987)				
2	*See* UCRL-96707	E 1.99:	DE87014350	MN -32	12:49220
CONF-871075-	(3. Oak Ridge model conference on waste problems, Oak Ridge, TN, USA, 13-16 Oct 1987)				
1-Vugraphs	*See* KY/L-1456	E 1.99:	DE87014092	MN -47	12:47194
CONF-871083-	(C.I.G.R.E. AC/DC transmission interactions and comparison symposium, Boston, MA, USA, 28-30 Oct 1987)				
1-Summ.	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87008774	MN -97a	12:47362
CONF-871089-	(American Society for Information Science's annual meeting, Boston, MA, USA, 4-8 Oct 1987)				
1	NTIS, PC A02/MF A01 (GPO Dep.)	E 1.99:	DE87010902	MN -101	12:47609
CONF-8710125-	(2. Rand antiproton conference, Santa Monica, CA, USA, 6-9 Oct 1987)				
1	*See* BNL-40089	E 1.99:	DE87013318	MN -28	12:48170
CONF-8710132-	(Department of Energy automated office support system conference, Denver, CO, USA, 7-8 Oct 1987)				
1	*See* DP-MS-87-94	E 1.99:	DE87014203	MN -32	12:49182
2	*See* DP-MS-87-92	E 1.99:	DE87014122	MN -32	12:49226
CONF-8710135-	(SEM fall meeting, Savannah, GA, USA, 25-28 Oct 1987)				
1	*See* SAND-87-0174C	E 1.99:	DE87014642	MN -38	12:48100
CONF-8710138-	(Joint IEEE/CSEE conference on high voltage transmission systems in China, Beijing, China, 17-22 Oct 1987)				
1	NTIS, PC A02; 3		DE87013682	MN -97a	12:47363
CONF-8710139-	(Instrumentation antenna technology conference, Atlanta, GA, USA, 6-8 Oct 1987)				
1-Vugraphs	*See* SAND-87-2001C	E 1.99:	DE87014853	MN -38	12:48147
CONF-8710140-	(3. international symposium on laser-aided plasma diagnostics, Los Angeles, CA, USA, 28-30 Oct 1987)				
1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014945	MN -20b	12:49057

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CONF-8710147-	(Howard R. Davis Society for knowledge utilization, Pittsburgh, PA, USA, 9-11 Oct 1987)			
1	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000342	MN -13	12:49224
CONF-8710148-	(10. international symposium on ballistics, San Diego, CA, USA, 28-30 Oct 1987)			
1	*See* SAND-87-0041C	E 1.99: DE87014217	MN -35	12:48297
CONF-871101-	(Joint meeting of the American Nuclear Society and the Atomic Industrial Forum, Los Angeles, CA, USA, 15-19 Nov 1987)			
6	NTIS, PC A02/MF A01 (GPO Dep.)	E 1.99: DE87011117	MN -32	12:49173
24	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87011664	MN -34C	12:48974
25	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87011665	MN -34C	12:48975
32	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87011672	MN -85	12:47198
33	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87011675	MN -34C	12:48976
42	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87012524	MN -2	12:48304
43	*See* DP-MS-87-65	E 1.99: DE87012383	MN -10	12:47196
48	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87012935	MN -85	12:47199
CONF-871112-	(3. international photovoltaic science and engineering conference, Tokyo, Japan, 3-6 Nov 1987)			
2	*See* SAND-87-2184C	E 1.99: DE87014641	MN -63	12:47302
CONF-871141-	(Symposium on operating systems principles, Austin, TX, USA, 9-11 Nov 1987)			
1	*See* UCRL-96080	E 1.99: DE87011544	MN -32	12:49219
CONF-871162-	(21. annual asilomar conference on signal, systems, and computers, Pacific Grove, CA, USA, 2-4 Nov 1987)			
1	*See* UCRL-96730	E 1.99: DE87013785	MN -32	12:49221
COO-				
3130TC-26	*See* DOE/ER/03130-26	E 1.99: DE87014481	MN -28	12:48200
3130TC-27	*See* DOE/ER/03130-27	E 1.99: DE87014480	MN -28	12:48201
4052-105	*See* DOE/ER/04052-105	E 1.99: DE87014004	MN -34C	12:48903
CRN-CPR-				
07-85	NTIS (US Sales Only), PC A06/MF A01	DE87752573	MN -4	12:48033
DCN-				
87-218-028-02	*See* PB-87-215984/XAB			12:47060
DHHS/PUB/NIOSH-				
85-114	*See* PB-87-205670/XAB			12:48529
87-101	*See* PB-87-205639/XAB			12:48528
DOE/BP/12871-				
T1	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87013428	MN -11	12:48401
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1	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99: DE87013429	MN -11	12:47277
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T1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000149	MN -95f	12:47669
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T2	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99: DE87014985	MN -94e	12:47709
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T1	NTIS, PC A11/MF A01; 1 (GPO Dep.)	E 1.99: DE87013504	STD -95f	12:47670
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33	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014465	MN -21	12:49123
34	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014464	MN -21	12:49124
39	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014463	MN -21	12:49125
41	NTIS MF A01; 2 (GPO Dep.)	E 1.99: DE87014649	MN -21	12:49126
47-Vol.31	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE87013732	MN -21	12:49127
48	University of Rochester, River Station Road, Rochester, NY 14627	TI87014470	ND -32	12:49175
57	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014467	MN -21	12:48136
61	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014471	MN -21	12:47811
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0053-Vol.1	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99: DE88000253	MN -11	12:48316
DOE/EIA-				
0109(87/ 06)	NTIS, PC A06/MF A01 - GPO; 1 (GPO Dep.)	E 1.99: DE87014541	MN -98B	12:47149
0226(87/ 06)	NTIS, PC A03/MF A01 - GPO; 1 (GPO Dep.)	E 1.99: DE87014991	MN -98E	12:47602
0292(86)	NTIS, PC A04/MF A01 - GPO; 1 (GPO Dep.)	E 1.99: DE87014539	MN -98B	12:47150
0293(87)	NTIS, PC A05/MF A01 - GPO; 1 (GPO Dep.)	E 1.99: DE87013862	MN -98	12:47574
0348(86)	NTIS, PC A08/MF A01 - GPO; 1 (GPO Dep.)	E 1.99: DE88000279	MN -98E	12:47603
0436(87)	NTIS, PC A05/MF A01 - GPO; 1 (GPO Dep.)	E 1.99: DE87014538	MN -98	12:47604
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0184/ 3	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000231	MN -13	12:49151
0312	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87013094	MN -11	12:48402
0326	NTIS, PC A22/MF A01; 1 (GPO Dep.)	E 1.99: DE88000129	MN -109	12:47014
0340	NTIS, PC A21/MF A01; 1 (GPO Dep.)	E 1.99: DE87014959	STD -25	12:47803
0341	NTIS, PC A11; 3	DE88000009	MN -32	12:49176
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26	NTIS, PC A09/MF A01; 1 (GPO Dep.)	E 1.99: DE88000262	MN -2	12:48865
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26	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014481	MN -28	12:48200
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36	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014475	MN -32	12:48230
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105	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014004	MN -34C	12:48903

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DOE/ER/12040-T1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87011257	MN -25	12:47804
DOE/ER/13147-3	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014580	MN -34	12:49010
DOE/ER/13175-T1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014166	MN -4	12:48424
DOE/ER/13178-T1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014544	MN -38	12:48093
DOE/ER/13276-T1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014636	MN -4	12:47812
DOE/ER/13347-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014804	MN -37	12:48278
DOE/ER/13582-1	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014647	MN -4	12:47947
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DOE/ER/13674-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000157	MN -4	12:47948
DOE/ER/25026-8	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014601	MN -32	12:49177
11	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014667	MN -32	12:49178
T1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014925	MN -32	12:49179
DOE/ER/25034-1	NTIS, PC A04; 3	DE87014493	MN -32	12:49180
DOE/ER/40200-099	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014585	MN -34D	12:48775
100	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014590	MN -34D	12:48776
102	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014225	MN -34D	12:48844
104	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014588	MN -34D	12:48777
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114	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE88000159	MN -34D	12:48778
DOE/ER/40246-2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014602	MN -34C	12:48897
DOE/ER/40252-2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014901	MN -34D	12:48779
DOE/ER/40256-2	NTIS, PC A07/MF A01; 1 (GPO Dep.)	E 1.99: DE87014581	MN -34C	12:48866
DOE/ER/40261-2	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE87014587	MN -34C	12:48867
DOE/ER/40272-34	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014589	MN -34	12:48845
39	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE87014591	MN -34D	12:48780
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DOE/ER/40334-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000063	MN -34C	12:48904
DOE/ER/45065-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014547	MN -38	12:48991
DOE/ER/45088-T2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014198	MN -25	12:47813
DOE/ER/45107-5	NTIS, PC A02; 3	DE87014432	MN -4	12:47891
6	NTIS, PC A02; 3	DE87014431	MN -4	12:47892
DOE/ER/45181-4	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000155	MN -25	12:47814
DOE/ER/45217-3	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014199	MN -25	12:47893
DOE/ER/45224-T1	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014068	MN -25	12:47894
DOE/ER/45234-T2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000158	MN -34	12:48992
DOE/ER/45268-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014902	MN -34	12:49009
DOE/ER/52139-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014893	MN -25	12:47815
DOE/ER/53212-110	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000177	MN -20g	12:49058
DOE/ER/53217-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014579	MN -34A	12:48714
DOE/ER/60405-2	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE87014455	MN -11	12:48317
DOE/ER/60415-3	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000165	MN -34	12:48993
DOE/ER/60514-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014802	MN -34A	12:48717
DOE/ER/60517-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87013916	MN -4	12:47985
DOE/ER/60546-2	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014666	MN -11	12:48380
DOE/ER/60561-1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014663	MN -48	12:48465
DOE/ER/60592-2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87013659	MN -11	12:48318

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3	NTIS, PC A02; 3		DE87013660	MN -11	12:48319
DOE/ET/10815- 121	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000178	MN -112	12:47610
DOE/ET/14692- 2377	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87006502	STD -101	12:47068
DOE/ET/15397- T6-Vol.1	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014453	MN -93	12:47714
DOE/ET/44802- T20	NTIS MF A01; 2		DE87012940	MN -70	12:47210
DOE/ET/51013- 214	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013942	MN -20	12:49128
DOE/ET/53017- 81	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014669	MN -20a	12:49059
DOE/ET/53088- 296	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000276	MN -20g	12:49060
297	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014811	MN -20f	12:49061
DOE/EV/10041- 1	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014545	MN -11	12:48438
DOE/FC/10503- 2399	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87006514	STD -101	12:47121
DOE/FE- 0084-2	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000008	STD -126	12:47163
DOE/FE/60177- 2420	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013719	MN -123	12:47188
2421	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000054	MN -123	12:47182
2424	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000141	STD -123	12:47189
2426	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000293	MN -123	12:47190
2427	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000291	MN -123	12:47038
2428	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000288	STD -109	12:47015
2429	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000289	STD -123	12:47191
2430	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000290	STD -123	12:47183
2432	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000385	STD -109	12:47016
DOE/FE/60457- H2	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014298	MN -101	12:47340
DOE/FE/60600- T14	NTIS, PC A25; 3 (GPO Dep.)	E 1.99:	DE87014737	MN -126	12:47133
DOE/HWP- 23	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000044	MN -4	12:47986
35	NTIS, PC A12; 3		DE87014886	MN -70A	12:47467
DOE/ID- 10158	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000106	STD -97e	12:47275
DOE/ID/12303- 6	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014460	STD -95f	12:47671
DOE/ID/12518- 1	NTIS, PC A07; 3		DE87014929	STD -95f	12:47672
DOE/ID/12551- 1	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013645	STD -95f	12:47673
DOE/ID/12597- 1	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014930	STD -95f	12:48153
DOE/ID/12605- T1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014502	MN -48	12:48466
DOE/MA- 0297-2	NTIS, PC A21/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000280	MN -13	12:49152
0311	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014996	MN -13	12:49153
DOE/MC/21071- 2358	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87009073	STD -111	12:47099
DOE/NBM- 7013290	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013290	MN -70	12:47211
7013291	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013291	MN -70	12:47212
7013292	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013292	MN -70	12:47213
7014503	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014503	MN -48	12:48467
DOE/NE/37959- 8	NTIS, PC A02; 3		DE87013658	MN -80	12:47441
11	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000066	MN -80	12:47442
DOE/OR- 884	NTIS, PC A07/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014967	MN -80	12:48094
DOE/PC/60050- 8	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014863	MN -108	12:47017
9	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014864	MN -108	12:47018
10	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014865	MN -108	12:47019
11	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014866	MN -108	12:47020
DOE/PC/70507- 11	NTIS, PC A07/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014126	MN -112	12:47611
DOE/PC/70771- T7	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014472	MN -105	12:47355
DOE/PC/70780- T8	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000055	MN -108	12:47266
DOE/PC/71257- T12	NTIS, PC A09/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013646	MN -108	12:47039
DOE/PC/80011- T2	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000298	MN -108	12:47260
DOE/PC/80517- T8	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000071	MN -113	12:47100

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DOE/PC/90266-					
T2	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013443	MN -104	12:48154
DOE/PC/90518-					
4	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000171	MN -102	12:48095
DOE/PC/90534-					
6	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000297	MN -108	12:47935
DOE/PC/90911-					
7	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013638	MN -108	12:47021
8	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014993	MN -108	12:47022
DOE/PC/91024-					
T3	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013554	MN -105	12:47356
DOE/PC/91271-					
T12	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014809	MN -102	12:47010
DOE/TIC-					
7000-R7	NTIS, PC A99/MF A01; 1 (GPO Dep.)	E 1.99:	DE87008007	MN -2	12:49225
DOT/FAA/CT-					
86/ 23	*See* AD-A-182196/6/XAB				12:47138
DP-MS-					
87-18	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87012921	MN -4	12:47936
87-61	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014437	MN -11	12:47214
87-65	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87012383	MN -10	12:47196
87-92	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014122	MN -32	12:49226
87-94	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014203	MN -32	12:49182
DPG-FR-					
87-003	*See* AD-A-182108/1/XAB				12:48403
DPSP-					
86-1026	NTIS, PC A18/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014843	MN -11	12:48411
DREA-TC-					
87/ 307	*See* AD-A-181980/4/XAB				12:47881
DTH-LV-MEDD-					
179	NTIS (US Sales Only), PC A13/MF A01; 1		DE87753059	MN -59B	12:47319
DTNSRDC/SME-					
87/ 41	*See* AD-A-182558/7/XAB				12:47140
E-					
3372	*See* N-87-23934				12:48128
3431	*See* N-87-24563				12:47909
3514	*See* N-87-25017				12:47861
3563	*See* N-87-24026				12:47313
3590	*See* N-87-24838				12:47565
3620	*See* N-87-23901				12:47309
3631	*See* N-87-24029				12:47564
3634	*See* N-87-24565				12:47041
3635	*See* N-87-24549				12:48088
3636	*See* N-87-24007				12:47830
3637	*See* N-87-24531				12:47310
3641	*See* N-87-23692				12:47459
3656	*See* N-87-24525				12:47460
ECE-COAL-					
108	Economic Commission for Europe, Geneva (Switzerland). Coal Committee				12:47071
109	Economic Commission for Europe, Geneva (Switzerland). Coal Committee				12:47101
ECTB-					
152-19A	*See* PB-87-205027/XAB				12:48343
163-14A	*See* PB-87-206611/XAB				12:48353
163-15A	*See* PB-87-206603/XAB				12:48352
EFI-					
812(39) -85	NTIS (US Sales Only), PC A03/MF A01		DE87702883	MN -34D	12:48750
822(49) -85	NTIS (US Sales Only), PC A02/MF A01		DE87702884	MN -34C	12:48868
EGG-					
2510	*See* NUREG/CR-4946		DE87013628	MN -78	12:47533
EGG-J-					
03487	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014879	MN -123	12:47187
EGG-M-					
32286	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014883	MN -25	12:47897
37586	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014882	MN -38	12:48091
EIR-					
613	NTIS (US Sales Only), PC A07/MF A01		DE87702885	MN -78	12:47369
623	NTIS (US Sales Only), PC A02/MF A01		DE87702886	MN -80	12:47468
624	NTIS (US Sales Only), PC A03/MF A01		DE87702887	MN -38	12:47411
ENEA-RT/FARE-					
85/ 8	NTIS (US Sales Only), PC A07/MF A01; 1		DE87900988	MN -63c	12:47300
EPA-					
450/ 2-86/ 001	*See* PB-87-206488/XAB				12:48399
450/ 4-87/ 008	*See* PB-87-206504/XAB				12:48349
450/ 4-87/ 010	*See* PB-87-206496/XAB				12:48348
520/ 6-86/ 020	*See* PB-87-205217/XAB				12:47240
530/ SW-86/ 040	*See* PB-87-215463/XAB				12:48418
540/ 1-87/ 001	*See* PB-87-215349/XAB				12:47585
600/ D-87/ 200	*See* PB-87-203287/XAB				12:48335
600/ D-87/ 211	*See* PB-87-209235/XAB				12:48358
600/ D-87/ 232	*See* PB-87-212742/XAB				12:48365
600/ D-87/ 236	*See* PB-87-212692/XAB				12:48430
600/ J-85/ 494	*See* PB-87-209284/XAB				12:48361

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600/ J-86/ 380	*See* PB-87-209193/XAB			12:48357
600/ J-86/ 385	*See* PB-87-208690/XAB			12:48355
EPA/ROD/R-				
01-86/ 017	*See* PB-87-189981/XAB			12:48415
01-86/ 018	*See* PB-87-190104/XAB			12:48416
02-86/ 024	*See* PB-87-183794/XAB			12:48412
02-86/ 031	*See* PB-87-188470/XAB			12:48447
02-86/ 037	*See* PB-87-190096/XAB			12:48449
03-86/ 025	*See* PB-87-188447/XAB			12:48444
03-86/ 033	*See* PB-87-188454/XAB			12:48445
04-86/ 009	*See* PB-87-188405/XAB			12:48413
04-86/ 013	*See* PB-87-189080/XAB			12:48448
05-86/ 043	*See* PB-87-189429/XAB			12:48414
06-86/ 010	*See* PB-87-188462/XAB			12:48446
EPRI-AP-				
5347	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920012	ND -111	12:47357
5390	NTIS, PC A06/MF A01 - Research Reports Center, Box 50490, Palo Alto, CA 94303; 1 (GPO Dep.)	E 1.99: DE88000309	MN -108	12:47023
5425	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI87920586	ND -111	12:47341
5432	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920027	ND -109	12:47024
EPRI-CS-				
4866	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI87920563	ND -105	12:47025
5371	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI87920556	ND -107	12:47358
5408-CCM	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920006	ND -105	12:47359
5415	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920018	ND -114	12:47342
EPRI-EA-				
4952	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920003	ND -11	12:48425
5321	NTIS, PC A07/MF A01 - Research Reports Center, Box 50490, Palo Alto, CA 94303; 1 (GPO Dep.)	E 1.99: DE87014223	MN -107	12:47055
5404	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920005	ND -11	12:48441
EPRI-EL-				
5215	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920011	ND -97c	12:47343
5302	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920010	ND -97a	12:47364
5375	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920014	ND -97a	12:47365
5387	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920001	ND -97b	12:47366
5431-Vol.2	NTIS, PC A04/MF A01 - Research Reports Center, Box 50490, Palo Alto, CA 94303; 1 (GPO Dep.)	E 1.99: DE88000062	MN -97b	12:47367
EPRI-EM-				
5356	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI87920571	ND -98	12:47605
EPRI-NP-				
5282	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920004	ND -80	12:47416
5357	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI87920573	ND -78	12:47469
5389	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920007	ND -78	12:47443
5396	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI87920577	ND -78	12:47434
5416	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920015	ND -80	12:47435
5419	Research Reports Center, Box 50490, Palo Alto, CA 94303	TI88920008	ND -80	12:47470
ESA-CR(P)-				
2299	*See* BLS-6423			12:47299
ETEC-				
87-6	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99: DE87014594	MN -59A	12:47320
ETN-				
87-99863	*See* BLS-6423			12:47299
ETSU-R-				
40	NTIS (US Sales Only), PC A05/MF A01; 1		MN -95e	12:47267
EUR-				
10133-EN	Commission of the European Communities			12:47102
10234	NTIS (US Sales Only), PC A04/MF A01	DE87752557	MN -37	12:48279
10282	NTIS (US Sales Only), PC A05/MF A01	DE87752558	MN -37	12:48231
10377	NTIS (US Sales Only), PC A03/MF A01	DE87752559	MN -15	12:47243
10422	NTIS (US Sales Only), PC A03/MF A01	DE87752560	MN -20d	12:49129
10426	NTIS (US Sales Only), PC A03/MF A01	DE87752556	MN -25	12:48232
10518-DE	Commission of the European Communities			12:47103
10576	NTIS (US Sales Only), PC A03/MF A01	DE87752561	MN -25	12:47817
10577-EN	Commission of the European Communities			12:47104

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10612-EN,IT	Commission of the European Communities			12:47037
10644-EN	Commission of the European Communities, Brussels (Belgium)			12:48320
10644-EN	*See* PB-87-209631/XAB			12:48364
10645-EN	Commission of the European Communities			12:48321
10673-DE	Commission of the European Communities			12:47072
10865-EN	British Coal, London (United Kingdom)			12:47073
10866-DE	Commission of the European Communities			12:47074
10880-FR	Centre de Pyrolyse de Marienau (France)			12:47026
10881-IT	Commission of the European Communities			12:47027
10896-FR	Commission of the European Communities			12:47075
10897-EN	British Coal, Stanhope Bretby (United Kingdom). Headquarters Technical Dept.; University of Newcastle-upon-Tyne (United Kingdom)			12:47076
10898-FR	Commission of the European Communities			12:47077
10899-EN	British Coal, London (United Kingdom)			12:47078
10900-FR	Institut National des Industries Extractives, Liege (Belgium)			12:47079
10901-DE	Commission of the European Communities			12:47080
10902-DE	Steinkohlenbergbauverein, Essen-Kray (Germany, F.R.)			12:47081
10904-EN	Commission of the European Communities			12:47011
10912-DE	Commission of the European Communities			12:47082
10913-EN	British Coal, London (United Kingdom)			12:47083
10914-DE	Commission of the European Communities			12:47084
10915-DE	Commission of the European Communities			12:47085
10916-DE	Commission of the European Communities			12:47086
10917-EN	British Coal, London (United Kingdom)			12:47087
10918-EN	Commission of the European Communities			12:47088
10942-DE	Steinkohlenbergbauverein, Essen-Kray (Germany, F.R.)			12:47040
10943-EN	British Coal, London (United Kingdom)			12:47028
10944-EN	Commission of the European Communities			12:47089
10945-FR	Centre d'Etudes et Recherches des Charbonnages de France, Verneuil-en-Halatte			12:47090
10991-DE	Commission of the European Communities			12:47091
EUR-CEA-FC-				
1281	NTIS (US Sales Only), PC A06/MF A01	DE87752592	MN -20f	12:49062
1309	NTIS (US Sales Only), PC A03/MF A01	DE87752593	MN -20f	12:49063
1310	NTIS (US Sales Only), PC A02/MF A01	DE87752594	MN -20f	12:49064
1311	NTIS (US Sales Only), PC A04/MF A01	DE87752595	MN -20d	12:49130
1313	NTIS (US Sales Only), PC A09/MF A01	DE87752596	MN -20f	12:49065
FEI-				
1780	NTIS (US Sales Only), PC A02/MF A01	DE87702888	MN -80	12:47444
1784	NTIS (US Sales Only), PC A02/MF A01	DE87702889	MN -80	12:47430
1798	NTIS (US Sales Only), PC A02/MF A01	DE87702890	MN -38	12:48127
FMPC-				
2077	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000243	STD -4	12:48280
GANIL-A-				
86-01	NTIS (US Sales Only), PC A03/MF A01	DE87752588	MN -28	12:48181
86-09	NTIS (US Sales Only), PC A02/MF A01	DE87752604	MN -28	12:48182
GKSS-				
86/ E/ 62	GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude, Germany, F.R.		ND -25	12:47818
87/ E/ 14	Special print from Water Sci. Technol. (1986) Vol. 18 p. 101-110		ND -11	12:48427
87/ E/ 16	NTIS (US Sales Only), PC A09/MF A01; 1	DE87753281	MN -11	12:48428
GR-				
87-8	*See* DOE/ET/44802-T20	DE87012940	MN -70	12:47210
GRS-S-				
40	Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln, Germany, F.R.		ND -80	12:47471
HEDL-SA-				
3379	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87010711	MN -20c	12:49131
3448-FP	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014374	MN -79	12:47452
3454-FP	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014373	MN -79	12:47472
3474-FP	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014377	MN -25	12:47819
3476	NTIS, PC A02; 3	DE87014372	MN -20c	12:49132
3563-FP	NTIS, PC A02/MF A01 (GPO Dep.)	E 1.99: DE87014364	MN -79	12:47453
3669-FP	NTIS, PC A02/MF A01 (GPO Dep.)	E 1.99: DE87014379	MN -15	12:47244
HETA-				
84-180-1776	*See* PB-87-206595/XAB			12:48351
84-496-1776	*See* PB-87-204954/XAB			12:48336
85-111-1770	*See* PB-87-206587/XAB			12:47193
85-150-1767	*See* PB-87-204996/XAB			12:48340
85-195-1768	*See* PB-87-204970/XAB			12:48338
86-070-1774	*See* PB-87-204962/XAB			12:48337
86-130-1775	*See* PB-87-206579/XAB			12:48350
86-328-1773	*See* PB-87-204988/XAB			12:48339
86-410-1772	*See* PB-87-205050/XAB			12:48345
IAE-				
4214/ 7	NTIS (US Sales Only), PC A03/MF A01	DE87702891	MN -20	12:49066
4248/ 16	NTIS (US Sales Only), PC A02/MF A01	DE87702892	MN -78	12:47417
4259/ 4	NTIS (US Sales Only), PC A02/MF A01	DE87702893	MN -79	12:47422

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4269/ 1	NTIS (US Sales Only), PC A02/MF A01		DE87702894	MN -34A	12:48718
4281/ 2	NTIS (US Sales Only), PC A03/MF A01		DE87702895	MN -34C	12:48905
4283/ 2	NTIS (US Sales Only), PC A02/MF A01		DE87702896	MN -78	12:47418
IAEA-SM-					
300/ 050	*See* CONF-871004-1	E 1.99:	DE87014563	MN -34C	12:48973
ICEAS-C-					
7	IEA Coal Research				12:47115
ICMA-					
87-105	*See* AD-A-182111/5/XAB				12:49164
ICTIS-RES-					
11	IEA Coal Research, London (United Kingdom)				12:47029
12	IEA Coal Research, London (United Kingdom)				12:47092
13	IEA Coal Research, London (United Kingdom)				12:47056
IDA-M-					
199	*See* AD-A-182501/7/XAB				12:48301
IDA-P-					
2017	*See* AD-A-182729/4/XAB				12:47801
IFE/KR/E-					
87/ 001	NTIS (US Sales Only), PC A02/MF A01		DE87752515	MN -11	12:49157
IFSR-					
296	*See* DOE/ET/53088-296	E 1.99:	DE88000276	MN -20g	12:49060
297	*See* DOE/ET/53088-297	E 1.99:	DE87014811	MN -20f	12:49061
IFVE-OEF-					
85-93	NTIS (US Sales Only), PC A02/MF A01		DE87702897	MN -34D	12:48751
86-132	NTIS (US Sales Only), PC A02/MF A01		DE87702898	MN -34D	12:48752
86-155	NTIS (US Sales Only), PC A02/MF A01		DE87702899	MN -34D	12:48753
IFVE-OEIPK-					
85-20	NTIS (US Sales Only), PC A02/MF A01		DE87702900	MN -34D	12:48754
86-158	NTIS (US Sales Only), PC A02/MF A01		DE87702901	MN -34D	12:48755
86-168	NTIS (US Sales Only), PC A02/MF A01		DE87702902	MN -34D	12:48756
IFVE-ONF-					
85-188	NTIS (US Sales Only), PC A02/MF A01		DE87702903	MN -34D	12:48757
86-37	NTIS (US Sales Only), PC A02/MF A01		DE87703236	MN -37	12:48233
86-94	NTIS (US Sales Only), PC A02/MF A01		DE87703237	MN -34D	12:48758
86-135	NTIS (US Sales Only), PC A02/MF A01		DE87703238	MN -34D	12:48759
86-136	NTIS (US Sales Only), PC A02/MF A01		DE87703239	MN -37	12:48274
86-160	NTIS (US Sales Only), PC A02/MF A01		DE87703240	MN -34D	12:48760
86-173	NTIS (US Sales Only), PC A02/MF A01		DE87703241	MN -37	12:48234
86-178	NTIS (US Sales Only), PC A02/MF A01		DE87703242	MN -37	12:48235
IFVE-OP-					
85-82	NTIS (US Sales Only), PC A02/MF A01		DE87703243	MN -28	12:48183
IFVE-ORI-					
85-3	NTIS (US Sales Only), PC A02/MF A01		DE87703244	MN -37	12:48236
85-4	NTIS (US Sales Only), PC A02/MF A01		DE87703245	MN -28	12:48224
85-5	NTIS (US Sales Only), PC A02/MF A01		DE87703246	MN -41	12:48980
85-8	NTIS (US Sales Only), PC A02/MF A01		DE87703247	MN -46	12:48977
IFVE-OTF-					
85-10	NTIS (US Sales Only), PC A02/MF A01		DE87703248	MN -34D	12:48781
85-68	NTIS (US Sales Only), PC A02/MF A01		DE87702904	MN -34D	12:48782
85-113	NTIS (US Sales Only), PC A03/MF A01		DE87703249	MN -34D	12:48783
85-122	NTIS (US Sales Only), PC A02/MF A01		DE87703250	MN -34D	12:48784
85-170	NTIS (US Sales Only), PC A02/MF A01		DE87703251	MN -34D	12:48785
85-180	NTIS (US Sales Only), PC A02/MF A01		DE87703252	MN -34D	12:48786
86-42	NTIS (US Sales Only), PC A02/MF A01		DE87703253	MN -34D	12:49031
86-50	NTIS (US Sales Only), PC A02/MF A01		DE87703254	MN -34D	12:48787
86-89	NTIS (US Sales Only), PC A02/MF A01		DE87703255	MN -34D	12:48788
86-99	NTIS (US Sales Only), PC A02/MF A01		DE87703256	MN -34D	12:48789
86-100	NTIS (US Sales Only), PC A02/MF A01		DE87703257	MN -34D	12:48790
86-123	NTIS (US Sales Only), PC A02/MF A01		DE87703258	MN -34D	12:48791
86-138	NTIS (US Sales Only), PC A02/MF A01		DE87703259	MN -34D	12:49032
86-152	NTIS (US Sales Only), PC A02/MF A01		DE87703260	MN -34D	12:48792
86-153	NTIS (US Sales Only), PC A02/MF A01		DE87703261	MN -34D	12:48793
IFVE-OUNK-					
85-128	NTIS (US Sales Only), PC A02/MF A01		DE87703262	MN -28	12:48202
85-129	NTIS (US Sales Only), PC A02/MF A01		DE87703263	MN -28	12:48184
86-71	NTIS (US Sales Only), PC A02/MF A01		DE87703264	MN -28	12:48203
86-73	NTIS (US Sales Only), PC A02/MF A01		DE87703265	MN -28	12:48185
86-97	NTIS (US Sales Only), PC A02/MF A01		DE87703266	MN -28	12:48225
IFVE-OUNK/ORI-					
86-58	NTIS (US Sales Only), PC A02/MF A01		DE87703267	MN -28	12:48226
INDC(HUN)-					
023/ L	NTIS (US Sales Only), PC A03/MF A01		DE87703268	MN -34C	12:48906
INIS-mf-					
10284	NTIS (US Sales Only), PC A05/MF A01		DE87752781	MN -28	12:48204
10649	NTIS (US Sales Only), PC A04/MF A01		DE87752461	MN -48	12:48497
10651	NTIS (US Sales Only), PC A04/MF A01		DE87752463	MN -48	12:48498
10652	NTIS (US Sales Only), PC A05/MF A01		DE87752462	MN -102	12:48237
10663	NTIS (US Sales Only), PC A06/MF A01		DE87752619	MN -34C	12:48892
10664	NTIS (US Sales Only), PC A05/MF A01		DE87752618	MN -25	12:47820
10665	NTIS (US Sales Only), PC A06/MF A01		DE87752617	MN -11	12:48429
10668	NTIS (US Sales Only), PC A04/MF A01		DE87752622	MN -41	12:48468
10669	NTIS (US Sales Only), PC A09/MF A01		DE87752620	MN -25	12:47821
10670	NTIS (US Sales Only), PC A12/MF A01		DE87752621	MN -4	12:47937
10672	NTIS (US Sales Only), PC A08/MF A01		DE87752779	MN -25	12:47898

Report Number	*Availability Source*	*File Number*	*Distribution Category*	*Abstract Number*
10673	NTIS (US Sales Only), PC A05/MF A01	DE87752780	MN -48	12:48499
10674	NTIS (US Sales Only), PC A02/MF A01	DE87752623	MN -2	12:47593
10676	NTIS (US Sales Only), PC A09/MF A01	DE87752790	MN -4	12:47938
10677	NTIS (US Sales Only), PC A08/MF A01	DE87752791	MN -4	12:48029
10679	NTIS (US Sales Only), PC A06/MF A01	DE87752793	MN -48	12:48464
10680	NTIS (US Sales Only), PC A05/MF A01	DE87752792	MN -48	12:48489
10681	NTIS (US Sales Only), PC A08/MF A01	DE87752789	MN -4	12:47987
10684	NTIS (US Sales Only), PC A11/MF A01	DE87752783	MN -38	12:48096
10685	NTIS (US Sales Only), PC A08/MF A01	DE87752784	MN -80	12:47473
10686	NTIS (US Sales Only), PC A07/MF A01	DE87752785	MN -11	12:48420
10687	NTIS (US Sales Only), PC A04/MF A01	DE87752782	MN -20f	12:49067
10690	NTIS (US Sales Only), PC A08/MF A01	DE87752787	MN -48	12:48523
10695	NTIS (US Sales Only), PC A06/MF A01	DE87752786	MN -48	12:48469
10696	NTIS (US Sales Only), PC A06/MF A01	DE87752778	MN -80	12:47474
10706	NTIS (US Sales Only), PC A16/MF A01	DE87752788	MN -97d	12:47345
10948	NTIS (US Sales Only), PC A05/MF A01	DE87702906	MN -41	12:47215
10956	NTIS (US Sales Only), PC A03/MF A01	DE87703269	MN -48	12:48470
10957	NTIS (US Sales Only), PC A05/MF A01	DE87703270	MN -2	12:49158
INIS-SU-				
409	NTIS (US Sales Only), PC A04/MF A01	DE88780002	MN -20f	12:49054
410	NTIS (US Sales Only), PC A03/MF A01	DE87780176	MN -34	12:48546
412	NTIS (US Sales Only), PC A04/MF A01	DE87780177	MN -34	12:48910
413	NTIS (US Sales Only), PC A04/MF A01	DE88780003	MN -20f	12:49055
415	NTIS (US Sales Only), PC A04/MF A01	DE87780178	MN -34D	12:49034
416	NTIS (US Sales Only), PC A04/MF A01	DE87780179	MN -34D	12:48746
417	NTIS (US Sales Only), PC A04/MF A01	DE88780004	MN -34	12:47805
418	NTIS (US Sales Only), PC A04/MF A01	DE87780180	MN -34D	12:48547
419	NTIS (US Sales Only), PC A04/MF A01	DE88780005	MN -34	12:48996
421	NTIS (US Sales Only), PC A03/MF A01	DE87702909	MN -34A	12:48097
INIS-XN-				
57	NTIS (US Sales Only), PC A09/MF A01	DE87703271	MN -70	12:47225
61	NTIS (US Sales Only), PC A05/MF A01	DE87702910	MN -38	12:47476
INS-				
565	NTIS (US Sales Only), PC A02/MF A01	DE87702911	MN -34D	12:49035
567	NTIS (US Sales Only), PC A02/MF A01	DE87702912	MN -34D	12:48848
573	NTIS (US Sales Only), PC A02/MF A01	DE87702913	MN -34D	12:48805
580	NTIS (US Sales Only), PC A03/MF A01	DE87702914	MN -34D	12:48849
581	NTIS (US Sales Only), PC A02/MF A01	DE87702915	MN -34D	12:48806
589	NTIS (US Sales Only), PC A02/MF A01	DE87702916	MN -34D	12:48840
591	NTIS (US Sales Only), PC A04/MF A01	DE87702917	MN -34D	12:49036
593	NTIS (US Sales Only), PC A04/MF A01	DE87702918	MN -34C	12:48885
594	NTIS (US Sales Only), PC A02/MF A01	DE87702919	MN -34D	12:48807
595	NTIS (US Sales Only), PC A02/MF A01	DE87702920	MN -34C	12:48916
596	NTIS (US Sales Only), PC A04/MF A01	DE87702921	MN -34C	12:48880
597	NTIS (US Sales Only), PC A02/MF A01	DE87702922	MN -34D	12:48808
599	NTIS (US Sales Only), PC A02/MF A01	DE87702923	MN -34C	12:48917
601	NTIS (US Sales Only), PC A02/MF A01	DE87702924	MN -34D	12:48809
602	NTIS (US Sales Only), PC A02/MF A01	DE87702925	MN -34D	12:48810
603	NTIS (US Sales Only), PC A02/MF A01	DE87702926	MN -34D	12:48811
604	NTIS (US Sales Only), PC A02/MF A01	DE87702927	MN -34C	12:48918
605	NTIS (US Sales Only), PC A02/MF A01	DE87702928	MN -22	12:47249
606	NTIS (US Sales Only), PC A02/MF A01	DE87702929	MN -34C	12:48871
607	NTIS (US Sales Only), PC A02/MF A01	DE87702930	MN -34D	12:48812
IOM-TM-				
87-05	Institute of Occupational Medicine			12:47093
IPNO-DRE-				
86-22	NTIS (US Sales Only), PC A02/MF A01	DE87752583	MN -34C	12:48919
IPNO-TH-				
86-51	NTIS (US Sales Only), PC A09/MF A01	DE87752342	MN -34C	12:48920
IPPJ-				
762	NTIS (US Sales Only), PC A04/MF A01	DE87702931	MN -20	12:49075
771	NTIS (US Sales Only), PC A02/MF A01	DE87702932	MN -20	12:49076
775	NTIS (US Sales Only), PC A02/MF A01	DE87702933	MN -20	12:49133
784	NTIS (US Sales Only), PC A02/MF A01	DE87702934	MN -20	12:49077
787	NTIS (US Sales Only), PC A02/MF A01	DE87702935	MN -20	12:49078
789	NTIS (US Sales Only), PC A02/MF A01	DE87702936	MN -20	12:49079
791	NTIS (US Sales Only), PC A03/MF A01	DE87702937	MN -20	12:49080
IPPJ-DT-				
126	NTIS (US Sales Only), PC A02/MF A01	DE87702938	MN -20	12:49134
129	NTIS (US Sales Only), PC A03/MF A01	DE87702939	MN -20	12:49081
130	NTIS (US Sales Only), PC A04/MF A01	DE87702940	MN -34B	12:48382
131	NTIS (US Sales Only), PC A08/MF A01	DE87702941	MN -20	12:49082
IR-				
1176	*See* NP-7900973	DE87900973	MN -116	12:47119
1184	*See* NP-7900974	DE87900974	MN -116	12:47120
IS-J-				
2501	*See* DOE/ER/40200-104	E 1.99: DE87014588	MN -34D	12:48777
2503	*See* DOE/ER/40200-099	E 1.99: DE87014585	MN -34D	12:48775
ITEF-				
44-1985	NTIS (US Sales Only), PC A03/MF A01	DE87703272	MN -34D	12:48813
53-1985	NTIS (US Sales Only), PC A02/MF A01	DE87703273	MN -34D	12:48761
62-1986	NTIS (US Sales Only), PC A02/MF A01	DE87703274	MN -28	12:48190
76-1986	NTIS (US Sales Only), PC A02/MF A01	DE87703275	MN -34D	12:48762
86-1986	NTIS (US Sales Only), PC A02/MF A01	DE87703276	MN -34C	12:48921

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90-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703277	MN -37	12:48282
97-1985	NTIS (US Sales Only), PC A03/MF A01		DE87703278	MN -34D	12:48763
97-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703279	MN -37	12:48244
98-1986	NTIS (US Sales Only), PC A02/MF A01		DE87702943	MN -37	12:48245
100-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703280	MN -37	12:48246
106-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703281	MN -37	12:48247
106-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703282	MN -34D	12:48814
107-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703283	MN -80	12:47454
119-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703284	MN -34D	12:48815
129-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703285	MN -32	12:49183
130-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703286	MN -34D	12:48764
135-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703287	MN -37	12:48146
147-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703288	MN -80	12:47431
150-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703289	MN -34D	12:48765
153-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703290	MN -20	12:49083
154-1986	NTIS (US Sales Only), PC A03/MF A01		DE87703291	MN -37	12:48248
155-1985	NTIS (US Sales Only), PC A03/MF A01		DE87703292	MN -28	12:48206
155-1986	NTIS (US Sales Only), PC A03/MF A01		DE87703293	MN -37	12:48249
157-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703294	MN -34B	12:48557
159-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703295	MN -37	12:48250
161-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703296	MN -37	12:48251
161-1986	NTIS (US Sales Only), PC A03/MF A01		DE87703297	MN -37	12:48252
162-1986	NTIS (US Sales Only), PC A03/MF A01		DE87703298	MN -37	12:48253
165-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703299	MN -34C	12:48872
167-1985	NTIS (US Sales Only), PC A03/MF A01		DE87703300	MN -37	12:48254
167-1986	NTIS (US Sales Only), PC A03/MF A01		DE87703301	MN -80	12:47455
168-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703302	MN -37	12:48255
170-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703303	MN -37	12:48256
171-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703304	MN -20	12:49084
172-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703305	MN -28	12:48207
ITEP-					
68-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703306	MN -34D	12:48816
69-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703307	MN -34C	12:48922
71-1985	NTIS (US Sales Only), PC A02/MF A01		DE87702944	MN -34D	12:48817
98-1985	NTIS (US Sales Only), PC A02/MF A01		DE87702945	MN -34C	12:48923
102-1986	NTIS (US Sales Only), PC A02/MF A01		DE87702946	MN -34D	12:48850
112-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703308	MN -34D	12:48818
116-1986	NTIS (US Sales Only), PC A03/MF A01		DE87703309	MN -34D	12:48851
142-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703310	MN -34D	12:48819
164-1986	NTIS (US Sales Only), PC A02/MF A01		DE87703311	MN -34D	12:48820
179-1985	NTIS (US Sales Only), PC A02/MF A01		DE87703312	MN -34D	12:48821
ITP-SB-					
87-20	*See* DOE/ER/40272-34	E 1.99:	DE87014589	MN -34	12:48845
IVL-B-					
823	NTIS (US Sales Only), PC A03/MF A01; 1		DE87753357	MN -11	12:47154
824	NTIS (US Sales Only), PC A02/MF A01; 1		DE87753353	MN -11	12:48322
IVO-A-					
05/ 87	NTIS (US Sales Only), PC A05/MF A01; 1		DE87753341	MN -95d	12:47639
IWGFPT-					
26	NTIS (US Sales Only), PC A07/MF A01; 1		DE87900925	MN -78	12:47406
IWS-					
125.26	*See* PB-87-205019/XAB				12:48342
147.28B	*See* PB-87-205043/XAB				12:48344
JA-					
5928	*See* AD-A-182076/0/XAB				12:48109
JINR-					
13-86-730	NTIS (US Sales Only), PC A02/MF A01		DE87703313	MN -37	12:48257
18-86-452	NTIS (US Sales Only), PC A02/MF A01		DE87703314	MN -51	12:48542
D-4-85-851	NTIS (US Sales Only), PC A18/MF A01		DE88780001	MN -34C	12:48944
JINR-E-					
1-86-643	NTIS (US Sales Only), PC A02/MF A01		DE87703315	MN -34C	12:48945
2-86-715	NTIS (US Sales Only), PC A02/MF A01		DE87703316	MN -34D	12:48823
4-86-396	NTIS (US Sales Only), PC A02/MF A01		DE87703317	MN -34C	12:48946
7-86-732	NTIS (US Sales Only), PC A02/MF A01		DE87703318	MN -34C	12:48899
JINR-R-					
1-86-669	NTIS (US Sales Only), PC A02/MF A01		DE87703319	MN -37	12:48258
2-86-349	NTIS (US Sales Only), PC A02/MF A01		DE87703320	MN -34D	12:48852
2-86-571	NTIS (US Sales Only), PC A02/MF A01		DE87703321	MN -34D	12:49037
2-86-629	NTIS (US Sales Only), PC A02/MF A01		DE87703322	MN -34C	12:48947
4-86-244	NTIS (US Sales Only), PC A02/MF A01		DE87703323	MN -34D	12:49038
4-86-439	NTIS (US Sales Only), PC A02/MF A01		DE87703324	MN -34D	12:49039
4-86-514	NTIS (US Sales Only), PC A02/MF A01		DE87703325	MN -34D	12:48853
4-86-756	NTIS (US Sales Only), PC A02/MF A01		DE87703326	MN -34C	12:48893
K/CSD/INF-					
87/ 10	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000199	MN -32	12:49227
K/PS-					
1260-Rev.1	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014562	MN -4	12:47988
KFK-					
4213	Special print from Z. Werkstofftech. (Dec 1985) Vol. 16(12) p. 407-413			ND -25	12:48138
KFTI-					
86-12	NTIS (US Sales Only), PC A02/MF A01		DE87703327	MN -20	12:49085
86-13	NTIS (US Sales Only), PC A02/MF A01		DE87703328	MN -20	12:49086
86-18	NTIS (US Sales Only), PC A02/MF A01		DE87703329	MN -34C	12:48948

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86-19	NTIS (US Sales Only), PC A02/MF A01		DE87703330	MN -34D	12:48824
86-21	NTIS (US Sales Only), PC A02/MF A01		DE87703331	MN -28	12:48175
86-22	NTIS (US Sales Only), PC A03/MF A01		DE87703332	MN -25	12:47823
86-24	NTIS (US Sales Only), PC A02/MF A01		DE87703333	MN -34C	12:48881
86-30	NTIS (US Sales Only), PC A02/MF A01		DE87703334	MN -20	12:49087
KTH-KTR-					
87-12	*See* STEV-NYEL-87-4		DE87753361	MN -110	12:47627
KTM/E-					
D-127	NTIS (US Sales Only), PC A03/MF A01; 1		DE87753334	MN -61	12:47301
KTM/E-B-					
57	NTIS (US Sales Only), PC A04; 3		DE87753323	MN -95d	12:47697
62	NTIS (US Sales Only), PC A06; 3		DE87753324	MN -104	12:47105
64	NTIS (US Sales Only), PC A04/MF A01; 1		DE87753325	MN -98	12:47579
KTM/E-D-					
113	NTIS (US Sales Only), PC A04; 3		DE87753344	MN -95	12:47268
121	NTIS (US Sales Only), PC A06/MF A01		DE87753339	MN -95d	12:47640
122	NTIS (US Sales Only), PC A06/MF A01; 1		DE87753061	MN -95d	12:47641
125	NTIS (US Sales Only), PC A08/MF A01; 1		DE87753062	MN -97d	12:47346
128	NTIS (US Sales Only), PC A12; 3		DE87753342	MN -95d	12:47642
129	NTIS (US Sales Only), PC A04; 3		DE87753343	MN -105	12:48323
130	NTIS (US Sales Only), PC A09; 3		DE87753340	MN -95d	12:47643
134	NTIS (US Sales Only), PC A07; 3		DE87753345	MN -61D	12:47261
KTM-TK-					
45173-01	*See* NEI-FI-25		DE87753333	MN -95f	12:47701
KTM-TP-					
65304-05	*See* NEI-FI-13		DE87753336	MN -95f	12:47699
KTM-TS-					
55312	*See* NEI-FI-6		DE87753337	MN -95f	12:47698
KVL-JI-MEDD-					
57	NTIS (US Sales Only), PC A05/MF A01; 1		DE87753058	MN -38	12:47269
KY/L-					
1456	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014092	MN -47	12:47194
LA-					
10619-HDR-Pt.1	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014710	STD -66b	12:47329
10619-HDR-Pt.2	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014711	STD -66b	12:47330
10696-MS	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014714	MN -66b	12:47325
10785-MS	NTIS, PC A09/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014713	MN -66b	12:47327
10889-M	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000194	MN -32	12:49184
10943-MS	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014709	STD -11	12:48535
11006-MS	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014707	STD -66b	12:47331
11014-MS	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014706	STD -38	12:48259
11017-M	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014633	MN -32	12:49185
11021-MS	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014705	STD -15	12:47245
11039-MS	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014703	STD -15	12:47246
11052-OBES	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014701	STD -66b	12:47332
11060-MS	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014700	STD -11	12:48305
11092-MS	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013633	MN -13	12:47592
LA-UR-					
87-2370	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013158	MN -37	12:48260
87-2464	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013164	MN -34D	12:48854
87-2613	NTIS, PC A02/MF A01 (GPO Dep.)	E 1.99:	DE87014742	MN -34	12:48736
87-2618	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014739	MN -34A	12:48997
87-2633	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014738	MN -34C	12:48949
87-2636	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014736	MN -38	12:47899
87-2644	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014735	MN -11	12:48404
87-2653	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014734	MN -28	12:48208
87-2679	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014732	MN -38	12:47900
87-2702	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014729	MN -25	12:47824
87-2712	NTIS, PC A02; 3		DE87014728	MN -37	12:48283
87-2714	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014727	MN -28	12:48191
87-2716	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014726	MN -34C	12:48950
87-2722	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014725	MN -34	12:48998
87-2746	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014722	MN -21	12:49088
87-2766	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014772	MN -28	12:48227
87-2804	NTIS, PC A02; 3		DE87014767	MN -34	12:48737
87-2807	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014764	MN -25	12:47825
87-2830	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014762	MN -20g	12:49089
87-2837	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014761	MN -37	12:48284
87-2842	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014760	MN -32	12:49186
87-2850	NTIS, PC A02; 3		DE87014759	MN -34	12:48738
87-2851	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014758	MN -34	12:49040
87-2853	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014757	MN -37	12:48261
87-2873	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014751	MN -25	12:47901
87-2875	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014750	MN -20f	12:49135
87-2882	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014748	MN -28	12:48115
87-2897	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014745	MN -34	12:48739
87-2921	NTIS, PC A02/MF A01 (GPO Dep.)	E 1.99:	DE87014744	MN -34	12:48999
87-2925	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014743	MN -34C	12:48951
LAL-					
86-29	NTIS (US Sales Only), PC A02/MF A01		DE87752584	MN -34D	12:48766
86-37	NTIS (US Sales Only), PC A02/MF A01		DE87752585	MN -34D	12:48767
86-43	NTIS (US Sales Only), PC A03/MF A01		DE87752586	MN -34D	12:48826
LBL-					
22817	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014084	MN -25	12:47826

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23189	NTIS, PC A03; 3		DE87013992	MN -41	12:48491
23235	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013969	STD -41	12:48501
23493	NTIS, PC A02; 3		DE87014678	MN -25	12:47902
23548	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000474	MN -34D	12:48768
23556	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014687	MN -28	12:48209
23614	NTIS, PC A03; 3		DE87014128	MN -25	12:47989
23645	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000211	MN -34D	12:48827
23710	NTIS, PC A09/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014691	MN -34A	12:48720
23717	NTIS, PC A09/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014676	MN -66	12:47328
23721	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014114	MN -66a	12:47334
23739	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014118	MN -34A	12:47903
23776	NTIS, PC A16/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014679	MN -25	12:47827
23804	NTIS, PC A09/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014685	MN -4	12:47990
23810	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014682	MN -25	12:47828
23872	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014680	MN -25	12:47859
LTKK-EN-C-					
42	NTIS (US Sales Only), PC A07/MF A01; 1		DE87753331	MN -38	12:48165
LYCEN-					
8539	NTIS (US Sales Only), PC A02/MF A01		DE87752571	MN -4	12:47939
8543	NTIS (US Sales Only), PC A02/MF A01		DE87752570	MN -4	12:47904
8553	NTIS (US Sales Only), PC A02/MF A01		DE87752569	MN -4	12:47905
8554	NTIS (US Sales Only), PC A02/MF A01		DE87752572	MN -34C	12:47906
8575	NTIS (US Sales Only), PC A03/MF A01		DE87752591	MN -34C	12:48952
8610	NTIS (US Sales Only), PC A02/MF A01		DE87752576	MN -34D	12:48953
8614	NTIS (US Sales Only), PC A02/MF A01		DE87752590	MN -34C	12:48954
MARINE-RESOURCES-TR-					
55	*See* PB-87-205902/XAB				12:47228
MCI-					
86-0182	*See* AD-A-182321/0/XAB				12:47883
MINTEK-M-					
288	Council for Mineral Technology				12:47106
MISU-CM-					
67	NTIS (US Sales Only), PC A03/MF A01; 1		DE87753348	MN -11	12:48329
69	NTIS (US Sales Only), PC A04; 3		DE87753356	MN -11	12:48330
MKS-					
86-26	*See* STEV-FBT-87-2		DE87753112	MN -95e	12:47705
MLM-					
3448(OP)	NTIS, PC A02; 3		DE87013745	MN -16	12:47247
3451	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014999	STD -4	12:47991
MMS/AK/EIS-					
85/ 005	*See* PB-87-202016/XAB				12:47157
85/ 006	*See* PB-87-202024/XAB				12:47158
MT-TIED-					
389	NTIS (US Sales Only), PC A03/MF A01; 1		DE87753338	MN -95f	12:47270
N-					
17-86	*See* INIS-SU-416		DE87780179	MN -34D	12:48746
18-86	*See* INIS-SU-415		DE87780178	MN -34D	12:49034
87-23692	NTIS, PC A03/MF A01				12:47459
87-23901	NTIS, PC A02/MF A01				12:47309
87-23934	NTIS, PC A02/MF A01				12:48128
87-24007	NTIS, PC A02/MF A01				12:47830
87-24026	NTIS, PC A02/MF A01				12:47313
87-24029	NTIS, PC A02/MF A01				12:47564
87-24247	NTIS, PC A18/MF A01				12:48558
87-24266	NTIS, PC A99/MF E03				12:48574
87-24378	NTIS, PC A02/MF A01				12:48286
87-24525	NTIS, PC A02/MF A01				12:47460
87-24531	NTIS, PC A02/MF A01				12:47310
87-24549	NTIS, PC A02/MF A01				12:48088
87-24563	NTIS, PC A02/MF A01				12:47909
87-24565	NTIS, PC A03/MF A01				12:47041
87-24838	NTIS, PC A02/MF A01				12:47565
87-25017	NTIS, PC A02/MF A01				12:47861
NADC-					
87029-60	*See* AD-A-182133/9/XAB				12:47882
NAGRA-NTB-					
84-33	Nagra, CH-5401 Baden, Switzerland			ND -70	12:47226
NAS-					
1.15:88344	*See* N-87-24378				12:48286
1.15:88931	*See* N-87-23934				12:48128
1.15:89849	*See* N-87-25017				12:47861
1.15:89904	*See* N-87-24563				12:47909
1.15:89913	*See* N-87-24026				12:47313
1.15:89922	*See* N-87-23901				12:47309
1.15:89927	*See* N-87-24029				12:47564
1.15:89930	*See* N-87-24565				12:47041
1.15:89931	*See* N-87-24007				12:47830
1.15:100101	*See* N-87-24531				12:47310
1.15:100102	*See* N-87-24838				12:47565
1.15:100109	*See* N-87-23692				12:47459
1.15:100112	*See* N-87-24525				12:47460
1.26:179636	*See* N-87-24549				12:48088
1.55:2464	*See* N-87-24247				12:48558
1.55:2466	*See* N-87-24266				12:48574

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NASA-CP-				
2464	*See* N-87-24247			12:48558
2466	*See* N-87-24266			12:48574
NASA-CR-				
179636	*See* N-87-24549			12:48088
NASA-TM-				
88344	*See* N-87-24378			12:48286
88931	*See* N-87-23934			12:48128
89849	*See* N-87-25017			12:47861
89904	*See* N-87-24563			12:47909
89913	*See* N-87-24026			12:47313
89922	*See* N-87-23901			12:47309
89927	*See* N-87-24029			12:47564
89930	*See* N-87-24565			12:47041
89931	*See* N-87-24007			12:47830
100101	*See* N-87-24531			12:47310
100102	*See* N-87-24838			12:47565
100109	*See* N-87-23692			12:47459
100112	*See* N-87-24525			12:47460
NATICK/TR-				
87/ 020	*See* AD-A-182035/6/XAB			12:47796
NBRI-BOU-				
75	*See* PB-87-196580/XAB			12:47648
NBSIR-				
87/ 3064	*See* PB-87-208732/XAB			12:47184
87/ 3532	*See* PB-87-201794/XAB			12:48875
NCAR/CT-				
107	*See* PB-87-213351/XAB			12:48368
NEI-DK-				
30	NTIS (US Sales Only), PC A05/MF A01	DE87752504	MN -41	12:47477
31	NTIS (US Sales Only), PC A12/MF A01	DE87752506	MN -41	12:47478
32	NTIS (US Sales Only), PC A12/MF A01	DE87752505	MN -41	12:47479
40	NTIS (US Sales Only), PC A05/MF A01; 1	DE87753056	MN -97e	12:47273
41	NTIS (US Sales Only), PC A04/MF A01; 1	DE87753057	MN -121	12:47162
42	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753060	MN -97e	12:47276
NEI-FI-				
5	NTIS (US Sales Only), PC A04/MF A01; 1	DE87753335	MN -97d	12:47347
6	NTIS (US Sales Only), PC A04/MF A01; 1	DE87753337	MN -95f	12:47698
7	NTIS (US Sales Only), PC A04/MF A01; 1	DE87753332	MN -95d	12:47645
13	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753336	MN -95f	12:47699
17	NTIS (US Sales Only), PC A04/MF A01; 1	DE87753064	MN -97d	12:47348
19	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753065	MN -95f	12:47700
20	NTIS (US Sales Only), PC A08/MF A01; 1	DE87753066	MN -95d	12:47710
24	NTIS (US Sales Only), PC A05/MF A01; 1	DE87753068	MN -11	12:48331
25	NTIS (US Sales Only), PC A09/MF A01; 1	DE87753333	MN -95f	12:47701
NEI-NO-				
23	NTIS (US Sales Only), PC A03/MF A01	DE87752528	MN -41	12:47480
NEI-SE-				
5	NTIS (US Sales Only), PC A03/MF A01; 1	DE87753359	MN -11	12:48332
NGU/R-				
86.160	NTIS (US Sales Only), PC A03/MF A01	DE87752529	MN -11	12:47481
86.161	NTIS (US Sales Only), PC A03/MF A01	DE87752530	MN -41	12:47482
NIIAR-				
14(695)	NTIS (US Sales Only), PC A03/MF A01	DE87703335	MN -79	12:47423
20(701)	NTIS (US Sales Only), PC A02/MF A01	DE87703336	MN -25	12:47831
23(704)	NTIS (US Sales Only), PC A02/MF A01	DE87703337	MN -25	12:47832
25(671)	NTIS (US Sales Only), PC A02/MF A01	DE87703338	MN -78	12:47407
30(676)	NTIS (US Sales Only), PC A02/MF A01	DE87703339	MN -80	12:47424
34(680)	NTIS (US Sales Only), PC A02/MF A01	DE87703340	MN -37	12:48287
NIIEFA-P-B-				
0697	NTIS (US Sales Only), PC A02/MF A01	DE87703341	MN -20	12:49136
NIIEFA-P-E-				
0707	NTIS (US Sales Only), PC A02/MF A01	DE87703342	MN -28	12:48210
NIIEFA-P-V-				
0680	NTIS (US Sales Only), PC A02/MF A01	DE87703343	MN -28	12:48211
0711	NTIS (US Sales Only), PC A02/MF A01	DE87703344	MN -28	12:48192
NIPER-				
214	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE87001243	STD -122	12:47124
228	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE87001258	STD -122	12:47134
NOAA-TM-ERL-SEL-				
75	*See* PB-87-203998/XAB			12:48695
NOBS-CIRC-				
172	*See* AD-A-181881/4/XAB			12:48548
NP-				
7753087	NTIS (US Sales Only), PC A14; 3	DE87753087	MN -98	12:47575
7753280	NTIS (US Sales Only), PC A04/MF A01; 1	DE87753280	MN -11	12:48333
7770317	NTIS (US Sales Only), PC A09; 3	DE87770317	MN -38	12:47992
7770318	NTIS (US Sales Only), PC A08; 3	DE87770318	MN -38	12:47349
7770319	NTIS (US Sales Only), PC A05; 3	DE87770319	MN -38	12:48129
7770320	NTIS (US Sales Only), PC A08; 3	DE87770320	MN -38	12:48130
7770321	NTIS (US Sales Only), PC A08; 3	DE87770321	MN -38	12:47785
7770322	NTIS (US Sales Only), PC A09; 3	DE87770322	MN -126	12:47125
7770323	NTIS (US Sales Only), PC A06; 3	DE87770323	MN -116	12:47094
7770324	NTIS (US Sales Only), PC A06; 3	DE87770324	MN -48	12:48525

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7770325	NTIS (US Sales Only), PC A06; 3	DE87770325	MN -41	12:47117
7770326	NTIS (US Sales Only), PC A03; 3	DE87770326	MN -41	12:48526
7770327	NTIS (US Sales Only), PC A03; 3	DE87770327	MN -41	12:48527
7900934	Charles R. Guinn, New York State Energy Office, Empire State Plaza, Albany, NY 12223-0001	TI87900934	MN -98	12:47576
7900936	Charles R. Guinn, New York State Energy Office, Agency Building No. 2, Empire State Plaza, Albany, NY 12223-0001	TI87900936	MN -98B	12:47151
7900938	Charles R. Guinn, New York State Energy Office, Agency Building No. 2, Empire State Plaza, Albany, NY 12223-0001	TI87900938	MN -98F	12:47577
7900972	NTIS, PC A08/MF A01; 1	DE87900972	MN -116	12:47118
7900973	NTIS, PC A03/MF A01; 1	DE87900973	MN -116	12:47119
7900974	NTIS, PC A17; 3	DE87900974	MN -116	12:47120
7900987	US Fish and Wildlife Service, 1010 Gause Blvd., Slidell, LA 70458	TI87900987	MN -11	12:48421
NUREG-				
1213-Rev.1	NTIS, PC A05/MF A01 - GPO	DE87900970	MN -70B	12:47595
NUREG/CP-				
0078	NTIS, PC A99/MF A01 - GPO	DE87900833	MN -80	12:47483
NUREG/CR-				
4577	NTIS, PC A04/MF A01 - GPO	DE87014110	MN -80	12:47445
4583-Vol.3	NTIS, PC A04/MF A01 - GPO	DE87014674	MN -78	12:47408
4760	NTIS, PC A18/MF A01 - GPO	DE87014885	MN -25	12:47436
4943	NTIS, PC A04/MF A01 - GPO	DE87011927	MN -80	12:47437
4946	NTIS, PC A05/MF A01 - GPO	DE87013628	MN -78	12:47533
4957	NTIS, PC A07 - GPO	TI87900979	MN -70	12:47227
4958	NTIS, PC A07/MF A01 - GPO	DE87014897	MN -80	12:47581
5002	NTIS, PC A04/MF A01 - GPO	DE88000300	MN -15	12:47248
5007	NTIS, PC A03/MF A01 - GPO	DE88900001	MN -78	12:47438
5008	NTIS, PC A03/MF A01 - GPO	DE87900990	MN -80	12:47534
NWC-TP-				
6794	*See* AD-A-182345/9/XAB			12:47326
ORNL-				
6187	*See* NUREG/CR-4760	DE87014885	MN -25	12:47436
6331	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE87014962	MN -13	12:47597
6343	NTIS, PC A15/MF A01; 1 (GPO Dep.)	E 1.99: DE87014958	STD -2	12:47933
6344	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE87014884	MN -11	12:47582
6393	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014964	MN -32	12:49208
6398	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE87014672	MN -32	12:47993
6400	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99: DE87014956	MN -98F	12:47152
6405/ R2	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99: DE87014957	MN -11	12:47583
ORNL/CON-				
221	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99: DE87014628	MN -95d	12:47646
ORNL/FEDC-				
86/ 5	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE87014976	STD -20c	12:49137
ORNL/M-				
329	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000056	MN -13	12:47647
358	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE87014561	MN -38	12:48098
395	*See* DOE/HWP-35	DE87014886	MN -70A	12:47467
406	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE87014358	MN -25	12:47910
ORNL/Sub-				
85-27461/ 1	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99: DE87014970	STD -97a	12:47368
ORNL/TM-				
9912	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000045	MN -32	12:49209
10015	*See* NUREG/CR-4577	DE87014110	MN -80	12:47445
10071/ R1	NTIS, PC A06/MF A01; 1 (GPO Dep.)	E 1.99: DE88000027	STD -80	12:47421
10086	NTIS, PC A14/MF A01; 1 (GPO Dep.)	E 1.99: DE88000029	MN -11	12:48334
10178	*See* DOE/HWP-23	E 1.99: DE88000044	MN -4	12:47986
10327	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE88000042	MN -4	12:47940
10333	NTIS, PC A03/MF A01 (GPO Dep.)	E 1.99: DE88000041	MN -32	12:47666
10354	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE88000040	MN -25	12:48140
10363	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000039	STD -20f	12:49090
10365	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000038	STD -20a	12:49138
10425	*See* NUREG/CR-4943	DE87011927	MN -80	12:47437
10429	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE88000026	MN -97c	12:47350
10434	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000025	MN -32	12:49210
10464	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE88000022	STD -20	12:49139
10467	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000021	STD -25	12:47427
10475	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000020	MN -93	12:48166
10482	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000017	STD -20	12:49140
10485	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000018	MN -96	12:47715
10488	NTIS, PC A16/MF A01; 1 (GPO Dep.)	E 1.99: DE88000001	MN -11	12:48544
10495	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000002	STD -13	12:49154
10498	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99: DE88000003	MN -32	12:49211
10506	NTIS, PC A07/MF A01; 1 (GPO Dep.)	E 1.99: DE88000030	MN -4	12:47941
10513	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000031	MN -80	12:47456
10514	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000032	MN -80	12:47457
10517	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99: DE88000033	MN -80	12:47458
10519	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99: DE88000034	STD -121	12:47153
10520	NTIS, PC A05/MF A01; 1 (GPO Dep.)	E 1.99: DE88000035	MN -13	12:49228
OTA-ITE-				
347	*See* PB-87-208062/XAB			12:47584

Report Number	Availability Source	File Number	Distribution Category	Abstract Number
OUP-				
87-02	NTIS (US Sales Only), PC A02/MF A01	DE87752512	MN -34D	12:48859
87-06	NTIS (US Sales Only), PC A03/MF A01	DE87752527	MN -37	12:48263
87-08	NTIS (US Sales Only), PC A02/MF A01	DE87752513	MN -34C	12:48894
87-09	NTIS (US Sales Only), PC A05/MF A01	DE87752531	MN -37	12:48288
87-10	NTIS (US Sales Only), PC A02/MF A01	DE87752514	MN -34C	12:48895
87-11	NTIS (US Sales Only), PC A04/MF A01	DE87752526	MN -34C	12:49159
87-12	NTIS (US Sales Only), PC A03/MF A01	DE87752520	MN -34B	12:48694
87-13	NTIS (US Sales Only), PC A02/MF A01	DE87752519	MN -20	12:49091
87-15	NTIS (US Sales Only), PC A02/MF A01	DE87752525	MN -34D	12:48828
87-16	NTIS (US Sales Only), PC A02/MF A01	DE87752524	MN -34D	12:49041
PATENTS-GB-	(GB: Comptroller-General, The Patent Office (Sale Branch), St. Mary Cray, Orpington, Kent, BR 53rd, UK, 0.25 pounds per copy)			
2179780/ A/				12:47631
PATENTS-US-	(US: Commissioner of Patents, Washington, DC 20231, USA, $1.50 per copy.)			
4,678,330				12:47297
4,681,795				12:47850
4,683,042				12:47944
4,683,123				12:48082
4,683,124				12:47945
4,683,154				12:47661
4,683,726				12:47659
4,683,749				12:49146
4,684,217				12:47660
4,684,582				12:47628
A 7-013,817				12:47929
PB-				
87-183794/ XAB	NTIS, PC A08/MF A01			12:48412
87-188405/ XAB	NTIS, PC A06/MF A01			12:48413
87-188447/ XAB	NTIS, PC A03/MF A01			12:48444
87-188454/ XAB	NTIS, PC A03/MF A01			12:48445
87-188462/ XAB	NTIS, PC A03/MF A01			12:48446
87-188470/ XAB	NTIS, PC A05/MF A01			12:48447
87-189080/ XAB	NTIS, PC A03/MF A01			12:48448
87-189429/ XAB	NTIS, PC A04/MF A01			12:48414
87-189981/ XAB	NTIS, PC A05/MF A01			12:48415
87-190096/ XAB	NTIS, PC A06/MF A01			12:48449
87-190104/ XAB	NTIS, PC A03/MF A01			12:48416
87-196580/ XAB	NTIS PC PC E05/MF E05			12:47648
87-198875/ XAB	NTIS, PC A99/MF E04			12:47155
87-198883/ XAB	NTIS, PC A99/MF E04			12:47156
87-198925/ XAB	NTIS, PC A99/MF E04			12:47126
87-199550/ XAB	NTIS, PC A09/MF A01			12:48417
87-201794/ XAB	NTIS, PC A03/MF A01			12:48875
87-202016/ XAB	NTIS, PC A99/MF A01			12:47157
87-202024/ XAB	NTIS, PC A18/MF A01			12:47158
87-203196/ XAB	NTIS, PC A09/MF A01			12:47351
87-203212/ XAB	NTIS, PC A03/MF A01			12:47667
87-203287/ XAB	NTIS, PC A02/MF A01			12:48335
87-203923/ XAB	NTISCP T02			12:47116
87-203998/ XAB	NTIS, PC A06/MF A01			12:48695
87-204517/ XAB	NTIS, PC A03/MF A01			12:47095
87-204533/ XAB	NTIS, PC A02/MF A01			12:47012
87-204558/ XAB	NTIS, PC A02/MF A01			12:47067
87-204939/ XAB	NTIS, PC A05/MF A01			12:48683
87-204947/ XAB	NTIS, PC A03/MF A01			12:48684
87-204954/ XAB	NTIS, PC A03/MF A01			12:48336
87-204962/ XAB	NTIS, PC A02/MF A01			12:48337
87-204970/ XAB	NTIS, PC A02/MF A01			12:48338
87-204988/ XAB	NTIS, PC A02/MF A01			12:48339
87-204996/ XAB	NTIS, PC A03/MF A01			12:48340
87-205001/ XAB	NTIS, PC A03/MF A01			12:48341
87-205019/ XAB	NTIS, PC A04/MF A01			12:48342
87-205027/ XAB	NTIS, PC A02/MF A01			12:48343
87-205043/ XAB	NTIS, PC A03/MF A01			12:48344
87-205050/ XAB	NTIS, PC A04/MF A01			12:48345
87-205217/ XAB	NTIS, PC A05/MF A01			12:47240
87-205266/ XAB	NTIS, PC A24/MF A01			12:48346
87-205290/ XAB	NTIS, PC A06			12:48347
87-205522/ XAB	NTISMF A01			12:47589
87-205639/ XAB	NTIS PC PC E07/MF A01			12:48528
87-205670/ XAB	NTIS, PC A12/MF A01			12:48529
87-205902/ XAB	NTIS, PC A02/MF A01			12:47228
87-206488/ XAB	NTIS, PC A08/MF A01			12:48399
87-206496/ XAB	NTIS, PC A04/MF A01			12:48348
87-206504/ XAB	NTIS, PC A03/MF A01			12:48349
87-206579/ XAB	NTIS, PC A02/MF A01			12:48350
87-206587/ XAB	NTIS, PC A03/MF A01			12:47193
87-206595/ XAB	NTIS, PC A02/MF A01			12:48351
87-206603/ XAB	NTIS, PC A02/MF A01			12:48352
87-206611/ XAB	NTIS, PC A02/MF A01			12:48353
87-207049/ XAB	NTIS, PC A02/MF A01			12:47057

Report Number	Availability Source	File Number	Distribution Category	Abstract Number
87-207056/ XAB	NTIS, PC A03/MF A01			12:47098
87-207106/ XAB	NTIS, PC A18/MF A01			12:47159
87-207122/ XAB	NTIS, PC A03/MF A01			12:47590
87-207197/ XAB	NTIS, PC A12/MF A01			12:47127
87-207213/ XAB	NTIS, PC A24/MF A01			12:47160
87-207247/ XAB	NTIS, PC A03/MF A01			12:47161
87-207932/ XAB	NTIS PC PC E04/MF E04			12:47702
87-208062/ XAB	NTIS, PC A04/MF A01			12:47584
87-208401/ XAB	NTIS, PC A03/MF A01			12:47096
87-208666/ XAB	NTIS, PC A04/MF A01			12:48696
87-208682/ XAB	NTIS, PC A02/MF A01			12:48354
87-208690/ XAB	NTIS, PC A02/MF A01			12:48355
87-208732/ XAB	NTIS, PC A04/MF A01			12:47184
87-208781/ XAB	NTIS, PC A08/MF A01			12:48356
87-209193/ XAB	NTIS, PC A02/MF A01			12:48357
87-209235/ XAB	NTIS, PC A02/MF A01			12:48358
87-209243/ XAB	NTIS, PC A02/MF A01			12:48359
87-209268/ XAB	NTIS, PC A02/MF A01			12:48360
87-209284/ XAB	NTIS, PC A02/MF A01			12:48361
87-209300/ XAB	NTIS, PC A02/MF A01			12:48362
87-209318/ XAB	NTIS, PC A02/MF A01			12:48363
87-209581/ XAB	NTIS, PC A08/MF A01			12:47180
87-209599/ XAB	NTIS, PC A07/MF A01			12:47178
87-209631/ XAB	NTIS PC PC E09/MF E09			12:48364
87-209979/ XAB	NTIS, PC A09/MF A01			12:47176
87-210399/ XAB	NTIS, PC A02/MF A01			12:47360
87-210472/ XAB	NTIS PC PC E04/MF A01			12:47271
87-210506/ XAB	NTIS PC PC E03/MF A01			12:47591
87-211959/ XAB	NTIS, PC A05/MF A01			12:47170
87-211975/ XAB	NTIS, PC A07/MF A01			12:47042
87-212437/ XAB	NTIS, PC A02/MF A01			12:48439
87-212692/ XAB	NTIS, PC A03/MF A01			12:48430
87-212742/ XAB	NTIS, PC A02/MF A01			12:48365
87-212767/ XAB	NTIS, PC A02/MF A01			12:48366
87-213112/ XAB	NTIS, PC A21/MF A01			12:47352
87-213260/ XAB	NTIS, PC A02/MF A01			12:48405
87-213302/ XAB	NTIS, PC A02/MF A01			12:48367
87-213351/ XAB	NTIS, PC A06/MF A01			12:48368
87-214565/ XAB	NTIS, PC A05/MF A01			12:47649
87-214755/ XAB	NTIS, PC A02/MF A01			12:47097
87-214854/ XAB	NTIS, PC A04/MF A01			12:48530
87-214862/ XAB	NTIS, PC A06/MF A01			12:48431
87-214870/ XAB	NTIS, PC A09/MF A01			12:48432
87-214953/ XAB	NTIS, PC A04/MF A01			12:48433
87-215349/ XAB	NTIS, PC A06/MF A01			12:47585
87-215356/ XAB	NTIS, PC A09/MF A01			12:48384
87-215372/ XAB	NTIS, PC A07/MF A01			12:47058
87-215463/ XAB	NTIS, PC A08/MF A01			12:48418
87-215695/ XAB	NTIS, PC A09/MF A01			12:47262
87-215703/ XAB	NTIS, PC A05/MF A01			12:47716
87-215778/ XAB	NTIS, PC A10/MF A01			12:47059
87-215901/ XAB	NTIS, PC A05/MF A01			12:47030
87-215927/ XAB	NTIS, PC A04/MF A01			12:47172
87-215935/ XAB	NTIS, PC A08/MF A01			12:47650
87-215943/ XAB	NTIS, PC A05/MF A01			12:47651
87-215950/ XAB	NTIS, PC A04/MF A01			12:47703
87-215968/ XAB	NTIS, PC A03/MF A01			12:47652
87-215984/ XAB	NTIS, PC A07/MF A01			12:47060
87-215992/ XAB	NTIS, PC A07/MF A01			12:47167
87-216016/ XAB	NTIS, PC A05/MF A01			12:47031
87-216453/ XAB	NTIS, PC A03/MF A01			12:47185
87-217444/ XAB	NTIS, PC A13/MF A01			12:47606
87-217451/ XAB	NTIS, PC A03/MF A01			12:47263
87-218137/ XAB	NTIS, PC A14/MF A01			12:47177
87-218145/ XAB	NTIS, PC A05/MF A01			12:47653
87-218152/ XAB	NTIS, PC A03/MF A01			12:47621
87-218160/ XAB	NTIS, PC A02/MF A01			12:47032
87-218178/ XAB	NTIS, PC A06/MF A01			12:47173
87-218186/ XAB	NTIS, PC A09/MF A01			12:47174
87-218871/ XAB	NTIS, PC A04/MF A01			12:47043
87-218905/ XAB	NTIS, PC A07/MF A01			12:47175
87-219374/ XAB	NTIS, PC A05/MF A01			12:48369
87-221222/ XAB	NTIS PC PC E99			12:47622
87-221230/ XAB	NTIS, PC A21/MF A01			12:47623
87-221248/ XAB	NTIS, PC A99/MF E04			12:47624
87-221289/ XAB	NTIS, PC A05/MF A01			12:47625
87-221305/ XAB	NTIS, PC A03/MF A01			12:47626
87-222683/ XAB	NTIS, PC A08/MF A01			12:47171
87-222691/ XAB	NTIS, PC A13/MF A01			12:47607
87-222717/ XAB	NTIS, PC A09/MF A01			12:47353
PFC/CP-				
87-2	*See* DOE/ET/51013-214	E 1.99:	DE87013942 MN -20	12:49128
PNL-				
5822-Vol.3	*See* NUREG/CR-4583-Vol.3		DE87014674 MN -78	12:47408

Report Number	Availability Source	File Number		Distribution Category	Abstract Number
6041	NTIS, PC A10/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014968	MN -11	12:48442
6201	NTIS, PC A07/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000250	MN -85	12:47201
6233	*See* NUREG/CR-4958		DE87014897	MN -80	12:47581
6249	*See* NUREG/CR-5002		DE88000300	MN -15	12:47248
6279-Vol.2	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014807	MN -32	12:48312
6279-Vol.3	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014808	MN -32	12:49212
6279-Vol.4	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000311	MN -32	12:49213
6317	NTIS, PC A07/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014823	MN -32	12:49214
6322	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000270	MN -85	12:47202
PNL-SA-					
15218	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000077	MN -95	12:47704
POEF-T-					
3456	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014827	MN -22	12:47195
PPP-Julk-					
3	NTIS (US Sales Only), PC A09/MF A01; 1		DE87753067	MN -103	12:47107
PPPL-					
2429	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000128	STD -20a	12:49092
2440	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000127	STD -20g	12:49093
2446	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000126	STD -20c	12:49141
2447	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000125	STD -20d	12:49094
2449	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000124	STD -20f	12:49095
2450	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000123	STD -20d	12:49096
2451	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000122	STD -20g	12:49097
2452	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000121	STD -20f	12:49098
2457	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000117	STD -20g	12:49099
2459	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000116	STD -20g	12:49100
2460	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000115	STD -20g	12:49101
2464	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000113	STD -20g	12:48721
2465	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000112	STD -20b	12:49142
2467	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000111	STD -20g	12:49102
PSI-					
2009/ TR-666	*See* AD-A-182462/2/XAB				12:47036
QFT-					
14	*See* AD-A-181911/9/XAB				12:48697
15	*See* AD-A-182638/7/XAB				12:48700
R-					
86AEB565	*See* AD-A-182720/3/XAB				12:47141
REPT-					
86-017-7767-1	*See* PB-87-203212/XAB				12:47667
87B0055	*See* N-87-24247				12:48558
471U-3065-52	*See* PB-87-215356/XAB				12:48384
RFP-					
3786	NTIS, PC A04/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014625	STD -25	12:47839
4104	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013381	MN -32	12:49215
4121	NTIS, PC A03; 3		DE87011051	MN -25	12:48141
RHO-HS-SR-					
86-1-P	NTIS, PC A08/MF A01; 1 (GPO Dep.)	E 1.99:	DE87012692	MN -70	12:47229
RI-					
180	NTIS (US Sales Only), PC A02/MF A01		DE87703345	MN -37	12:48264
184	NTIS (US Sales Only), PC A02/MF A01		DE87703346	MN -37	12:48265
RISO-R-					
543	NTIS (US Sales Only), PC A03/MF A01		DE87752503	MN -2	12:49160
RRK-					
86-6	NTIS (US Sales Only), PC A02/MF A01		DE87703347	MN -34D	12:48841
86-41	NTIS (US Sales Only), PC A02/MF A01		DE87703041	MN -34B	12:48685
86-42	NTIS (US Sales Only), PC A02/MF A01		DE87703042	MN -34D	12:49042
86-43	NTIS (US Sales Only), PC A02/MF A01		DE87703043	MN -34B	12:48686
86-44	NTIS (US Sales Only), PC A02/MF A01		DE87703044	MN -34D	12:49043
SAIC-					
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86-2875C-FP	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014651	MN -38	12:48099
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87-0043	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE88000006	MN -37	12:48289
87-0089C	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014895	MN -71	12:47203
87-0151	NTIS, PC A11/MF A01; 1		DE88000110	MN -71	12:47204
87-0174C	NTIS, PC A02/MF A01; 1 (GPO Dep.)	E 1.99:	DE87014642	MN -38	12:48100
87-0630	NTIS, PC A03/MF A01; 1 (GPO Dep.)	E 1.99:	DE87013842	MN -70	12:47231
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87-0937C	NTIS, PC A02; 3		DE87013725	MN -25	12:47862
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BA	Book analytic
P	Patent
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D	Dissertation
TG	Translation (general)
TA	Translation (analytic)

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TD Chad
TG Togo
TH Thailand
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TO Tonga
TR Turkey
TT Trinidad and Tobago
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TZ United Republic of Tanzania

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UG Uganda
US United States of America (USA)
UY Uruguay

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VE Venezuela
VI Virgin Islands of the United States
VN Viet Nam

WS Western Samoa

YD Democratic Yemen
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To keep science, industry, the government, and the public up to date on worldwide energy literature, the DOE Office of Scientific and Technical Information publishes a series of Current Awareness Bulletins on various aspects of energy production and use. The information abstracted in these bulletins comes from scientific and technical reports, journal articles, conference papers and proceedings, patents, theses, books, and monographs. The semimonthly bulletins are:

ACID PRECIPITATION (PB87-901000) Wet and dry deposition, long-range transport, environmental effects, modeling, and socioeconomic factors.

BUILDINGS ENERGY TECHNOLOGY (PB87-900700) Technology required for economic energy conservation in buildings of all types.

COAL-BASED SYNFUELS (PB87-901400) Conversion of coal to gaseous or liquid fuels.

COAL COMBUSTION AND UTILIZATION (PB87-914400) All aspects of coal combustion and direct utilization, including fluidized-bed combustion, MHD generators, and coal fuel cells.

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DIRECT ENERGY CONVERSION (PB87-946600) Photovoltaic conversion, magnetohydrodynamics, electrohydrodynamics, thermoelectric generators, thermionic converters, fuel cells, etc.

ENERGY FROM BIOMASS (PB87-900600) Biomass production, conversion, and use for energy.

GEOTHERMAL ENERGY TECHNOLOGY (PB87-914700) Technology required for economic recovery of geothermal energy and its use, either directly or to produce electricity.

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NUCLEAR FUEL CYCLE (PB87-913400) Uranium reserves, ore exploration, mining, processing, and enrichment; spent-fuel reprocessing; nuclear materials management and safeguards; nuclear fuel fabrication and properties; and environmental and health and safety aspects.

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RADIOACTIVE WASTE MANAGEMENT (PB87-902900) Spent-fuel transport and storage, radioactive effluents from nuclear facilities, techniques of processing radioactive wastes, and ultimate disposal of the wastes.

SOLAR THERMAL ENERGY TECHNOLOGY (PB87-901200) Research and development relating to the use of solar thermal systems as a significant energy source.

TRANSPORTATION ENERGY RESEARCH (PB87-900900) Engineering and design of energy-efficient automotive propulsion systems and all aspects of energy conservation in transportation.

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